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INDUSTRIAL MEDICINE

Industrial Health, Occupational Diseases and Traumatic Surgery

December, 1943

A Practical Program
— For Human Rehabilitation —

The Cardiac under Forty-Five
— His Placement in Industry —

Asthma
— Prevention in Occupation —

Radium Painting
— Hazards and Precautions —

Aminothiazole
— Toxicity in Industrial Use —

Brucellosis
— Preliminary Report on Treatment —

An Industrial Medical Department
— Organization and Administration —

Medical Services
— Special Problems in Small and Medium-Sized Plants —

Carbon Tetrachloride
— Reports of Occupational Injuries —

The Family Physician
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The Workman's Heart
— Symposium Abstracts —

Men Who Made Industrial Medicine
— Appraisal of One Man's Place in Its History —

Volume 12 Number 12

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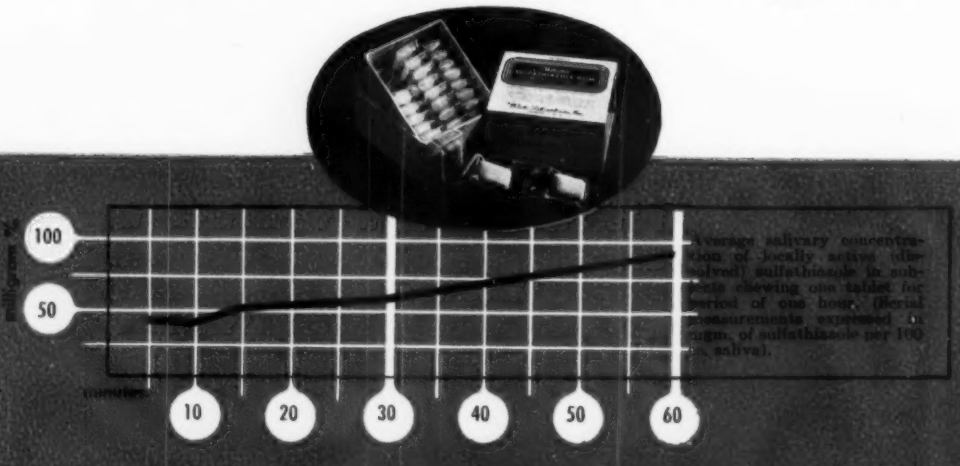

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OCCUPATIONAL DISEASES
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INDUSTRIAL HYGIENE
INDUSTRIAL MEDICINE
& RAILROAD SURGERY

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THERE are several rehabilitation plans now successfully under way. Notable among them are the Rochester Plan, with which DR. SAWYER is identified, the Connecticut Plan as to which DR. BIRAM was among the prime movers, and the plans of the various government agencies now being given publicity. All these plans have a common objective; they differ only in their emphasis upon certain points of special excellence. But DR. VONACHEN'S Peoria Plan (page 807) carries the whole idea of rehabilitation to the ultimate excellence that might have been lacking in any such movement, because in his plan, for the first time, industry is coming to the groups through which the handicapped, civil and military, can be identified, and saying: "We're ready. We have the jobs; where are the men to fill them?" The successful answer to one of the country's biggest postwar problem is implicit in the community basis of this plan. To those who believe that only government can solve this problem we recommend a careful study of what they are doing in Peoria. The full story is so replete with significances as to make DR. VONACHEN'S description seem all too brief. The story here, however, is the prelude to the powerful and very moving sound film which DR. VONACHEN prepared and which he exhibits as evidence that his plan works. The picture is available; write to him for the details of both the picture and the plan. . . . THE value of MR. QUADLAND'S literature studies of occupational injuries attributed to volatile solvents (see "Carbon Tetrachloride," page 821) has a long-range quality, in that it will be examined by writers on the subject as the basis of references for many years to come. The series will be reprinted as a whole, after publication of the last installment. . . . DR SCHREINER'S "Brucellosis" (page 840) calls attention, by implication rather than directly, to the occupational

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disease possibilities of this infection. Public Health reports have noted the frequency of incidence in packing houses; DR. HARRIS, in his recent book on "Brucellosis," remarks on the "alarmingly high percentage" of slaughter house employees who develop it; and DR. HUDDLESON, in his latest edition on "Brucellosis in Man and Animals," speaks of the high incidence of infection in packing plant employees. He also notes that in Iowa the relative incidence was nearly six times as great per 100,000 population as the total of all other cases, including farmers, other workers, students and children. HARRIS also mentions that in California undulant fever contracted in slaughter houses and laboratories is entitled to workmen's compensation. A butcher in New York was awarded compensation for it in 1932, and in 1933 the Idaho State Commission held it a compensable ailment. There is some medical opinion to the effect that undulant fever is coming, rather than going, and that we are to hear much more of it in the not too distant future. In Chicago the Board of Health reports that the cases during the last five years have been as follows: 14 in 1938; 26 in 1939; 20 in 1940; 24 in 1941; and 30 in 1942. . . . IT WILL be characteristic of DR. WATSON to consider the appraisal of his place in the history of industrial medicine on page 843 a bit too eulogistic. But he has little choice in the matter, and, besides, to those whose composite valuations it represents, the sketch as it appears is somewhat remarkable in certain respects of understatement. . . . IN THE NEWS department one is impressed with the attention the medical services for Federal workers are paying to psychiatry (pages 15 and 22). We hope the emphasis on the apparent need for psychiatrists in Washington is "purely coincidental". . . . DR. KRIEGER'S medical transfer department, explained at the Industrial Hygiene Foundation meeting last month (page 883), is a new idea in industrial medicine in that it centralizes and coordinates in the medical department not only the rehabilitation problem but also the readjustment problem. The matter of "transfers" is encountered with increasing frequency; this is the first instance of its having been equipped, as it were, with its own personnel. The precedent will be very useful in many companies where the problem has become acute. . . . It is our privilege again this year to publish the lecture texts from the Post-Graduate Course in Industrial Medicine at Long Island College of Medicine These begin with DR. MANSON'S (page 846) and DR. HOLMBLAD'S (page 862). . . .

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1. Schwartz, Louis: Public Health Reports 56:1788-1790, 1941.

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PERSONAL

DR. JOSEPH C. DONCHESS, assistant surgeon since 1937, has been appointed chief surgeon of the two Gary plants of the Carnegie-Illinois Steel Corporation, succeeding the late DR. FRANK W. MERRITT. DR. DONCHESS will continue to maintain headquarters in the medical department at the Gary steel works, but will also have supervision over the medical staff at the Gary sheet and tin mill.

DR. MILTON H. KRONENBERG, chief, Industrial Hygiene Division, Illinois Department of Health, and MISS SARA E. SOUTHALL, supervisor of women, International Harvester Company, Chicago, were speakers at a forum on women in industry, feature of the Indiana Safety and Health Congress held at Indianapolis, November 4-5.

DR. GEORGE H. GEHRMANN, chief of medical staff of E. I. du Pont de Nemours & Co., Inc., sponsored the eighth annual conference of the Du Pont Medical Division which was held November 10-12 at Wilmington, Delaware. Industrial physicians from all parts of the country, as well as most of the medical directors of Du Pont's numerous plants both in the United States and Canada were DR. GEHRMANN'S guests at this conference.

DR. THEODORE A. LITTLE, medical director, General Electric Company, Erie, Pennsylvania, presided at a session of a Health Institute at Erie on November 10, at which DR. JOHN R. CONOVER, co-chairman of the Pennsylvania Medical Society's commission on industrial health and hygiene, spoke on "Industrial Diseases and the War Effort." This was the first of a series of six Health Institutes sponsored by the state health department, the state and county medical societies and other health organizations, to be held in six different cities.

DR. JOSEPH SHILEN, director of Pennsylvania's Bureau of Industrial Hygiene, addressing a joint meeting of the Berks County Medical Society and the Reading Council of Social Agencies, at Reading, November 9, discussed the survey of

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Staphylococcus, aureus and albus	3,000 million
Klebsiella pneumoniae (Friedlander bacillus)	1,000 million
Corynebacterium pseudodiphthericum (pneudodiphtheria bacillus)	1,000 million

ECTO-ANTIGENS

Pneumococcus (Diplococcus pneumoniae)	2,000 million
Streptococcus (hemolytic and non-hemolytic)	2,000 million
Hemophilus influenzae	2,000 million
Neisseria catarrhalis	2,000 million
Staphylococcus, aureus and albus	2,000 million

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medical facilities in industry in Berks County recently completed by his Bureau. A total of 181 plants employing 44,070 persons were surveyed. Full-time physicians are employed in two of the plants and part-time physicians in three. Full-time nursing service is available in 13 plants and part-time service in three. One hundred five plants spent less than $100 on their medical programs, other than compensation cases, during 1942, according to the survey. Forty-one of the remainder had no record of any expenditure of this type. One hundred forty-five plant medical departments handled approximately 113,000 cases during 1942, the remaining 36 having no record of this service. Ninety-one plants signified their interest in having a physician give health talks to their employees.

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what is said to be one of the finest laboratories of its kind in the country, recently completed as an adjunct to the department at the state capitol. The new laboratory is fully equipped to make all the various types of tests and analyses involved in industrial exposures of every kind, and, in addition, has facilities available to physicians for diagnosis of ailments suspected from chemical or physical agents to which workers have been exposed. The laboratory and research facilities are particularly valuable in coping with new hazards and situations which arise from time to time and must be evaluated. Dangers to health encountered in old established industries, such as mining and smelting, are fairly well understood and can be met if proper precautions are taken. DR. JONES also called attention to the complete reference library on occupational diseases now in his office at the capitol. It contains 100 modern reference volumes and upwards of 3000 reprints and reports. Assisting DR. JONES in administering the division are JACK NEAL, chief industrial hygiene engineer; GERALD WRIGHT, assistant engineer; MAX L. SWEAT, chemist; MISS VERL BAKER, consulting industrial hygiene nurse, and MRS. ELISE FULLMER, secretary.

DR. LEVERETT D. BRISTOL, Health Director of American Telephone & Telegraph Company since 1929, resigned December 1, to become executive director of the Hospital Council of Greater New York. This Council is a community planning agency to coordinate and improve the hospital and health services of New York City and to plan the economical development of these services in relation to community needs. It is made up of about 20 leading voluntary and government health, hospital, medical, welfare, and business organizations of the city and state, and its work is carried on through a planning committee of representatives of member agencies, in close working relationship with the United Hospital Fund of New York City. One of the immediate important projects will be to develop a so-called "master plan," including the present and the post-war periods, for the organized care of the sick in Greater New York. DR. BRISTOL'S new adddress is 370 Lexington Avenue, New York City. He writes: "It is needless for me to say that after so many years in the service of the industrial health field, I shall always retain an active interest in the subject and hope, so far as

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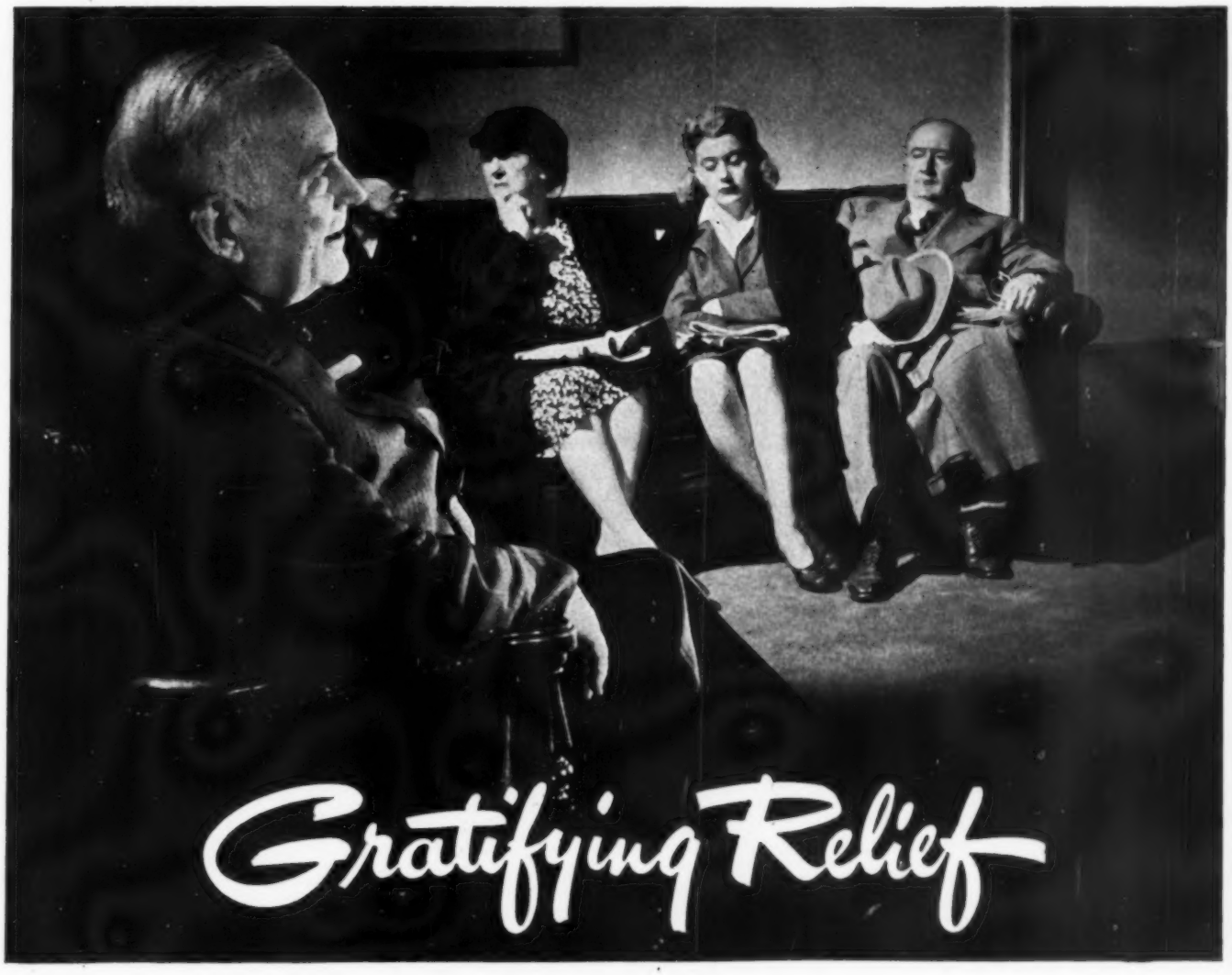

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GENERAL

A COURSE in "Occupational Dermatoses" was held at the headquarters of the Academy of Medicine, in New York City, on December 6-11. Twenty-four hours of lectures were given by DR. LOUIS SCHWARTZ, Chief, Dermatoses Investigations Section, Division of Industrial Hygiene, National Institute of Health, U. S. Public Health Service.

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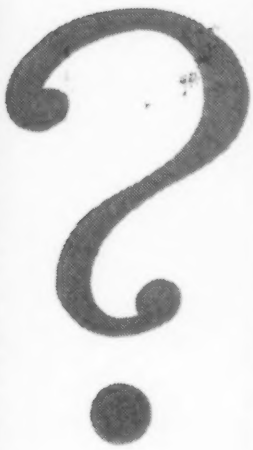

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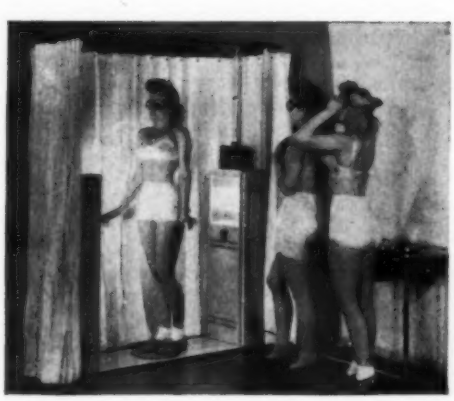

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Appreciated Dual Action

IN RESPIRATORY INFECTIONS

In acute coryza, pharyngitis, tonsillitis, and influenza, the effective therapeutic approach includes both systemic and local measures to combat the patient's discomfort. Baume Bengué provides the dual action needed. Containing menthol and methyl salicylate, it induces an intense and prolonged local active hyperemia which relieves joint, muscle, and nerve pain. Through cutaneous absorption of its salicylate, Baume Bengué also exerts a systemic influence. Thus by virtue of its valuable analgesic and antipyretic actions, Baume Bengué affords appreciated adjuvant therapy in self-limited but nevertheless uncomfortable respiratory infections.

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the past two years. The headquarters of the service are located in the Pentagon Building. In this program, in addition to emergency treatment and medical service, education consultation is provided, and special attention has been given the problem of mental disease by a medical specialist in neurology. A tuberculosis case finding program is being conducted by a tuberculosis specialist and three x-ray technicians; 15,000 chest x-rays have been completed.

—*Industrial Hygiene*, November, 1943.

AN "Industrial Nursing" course is being offered by the Syracuse University Extension Course in cooperation with the Syracuse Branch of the Division of Industrial Hygiene, New York State Department of Labor. MISS MARGARET J. NICHOLS, Industrial Nursing Consultant for this Branch, is the instructor. Thirty-six nurses in the area including, Binghamton, Johnson City, and Endicott are enrolled.

JOHNS HOPKINS University is offering an evening course in "Industrial Nursing" during the fall semester under the leadership of MISS ETHEL TURNER.

DR. NATHAN MILLMAN, Brooklyn, has been appointed director of the new division of industrial hygiene established as a joint program of the state department of labor, the New York City Health Department and the U. S. Public Health Service. An experimental program will be carried out for six months in the Astoria, Long Island, area.

MAJOR GENERAL JAMES CARRE MAGEE, Medical Corps, U. S. A., retired, has been named executive officer of the information service of the division of medical sciences of the National Research Council, the service established under the recent grant of the Johnson & Johnson Research Foundation, of New Brunswick, New Jersey, by which $75,000 was made available to the Council to enable it to assemble and disseminate as far as possible, medical information pertaining to the war effort. The enterprise is expected to fill a long felt need in providing up-to-date information to the medical officers of the armed services both in this country and abroad and in making the experience of war medicine available as far as possible to civilian physicians. GENERAL MAGEE graduated at Jefferson Medical College in 1905, and has spent his entire professional life in the medical service of the Army. He was assigned to the Philippines before the first World War and then recalled for European duty from 1917 to 1919. He was appointed Surgeon General of the Army in 1939 and on May 31, 1943, was retired on completion of the four-year term of duty. It was under his direction that the Medical Corps was enormously expanded to meet the demands of the present war and the program of service adopted which has led to the remarkable health record of the Army. GENERAL MAGEE holds the honorary degree of Doctor of Science from Jefferson Medical College, and was recently awarded the Distinguished Service Medal for outstanding services as Surgeon General.

New Dispensary

EVERYTHING from removal of an irritating fleck of dust from a worker's eye to complete first aid treatment for more serious industrial accidents, is possible in the new medical industrial dispensary established for men and women at the Emeryville, California, works of the Westinghouse Electric & Manufacturing Co. Actual first aid treatment available at the station is being supplemented by a thorough and continuing education-for-health-and-safety campaign. Heading the department is MISS NORINNE C. ZEIGLER, R.N., of Oakland, who works under the direction of DR. N. P. DUNNE. The dispensary, equipped with fluorescent lighting has a waiting room, an emergency room, and two cot rooms, one for the men and one for the women. The treatment room has an examining table, dressing table, infra-red heat lamps, and even a foot bath.

—Item in *San Francisco News*, November 19.

Acute Cadmium Poisoning

IN AN Indiana plant, one worker died within four days after a prolonged exposure to high concentrations of cadmium fumes. This death could have been prevented if someone responsible for setting up manufacturing processes had remembered that cadmium was very toxic and that if the metal was heated the workers would be exposed to high concentrations of a poisonous material. The deceased worker undertook a job of "flanging" two-inch cadmium plated stainless steel pipe. To produce a flange, the pipe was heated with a blow torch until it became a cherry red color. Soon after beginning the operation the

MA'S GOT AN ASSISTANT.....

• MA'S COOKING MAY *TASTE* FINE but there is plenty of evidence to indicate that frequently it lacks many of the accessory food factors necessary to proper development and the maintenance of health.[1]

But even if Ma knew all about vitamins she would have trouble selecting and preparing an adequate diet, because "any given foodstuff varies greatly from day to day, season to season, or place to place, in its vitamin content."[2]

And anyway, she'd have a time convincing her family that what they like is not necessarily the best thing to eat.

That's where Ma's assistant, the Nutrition Research Worker, comes in. By means of his accurately measured vitamin supplements, diets can be made adequate with respect to those vital factors, improper eating habits can be offset, and loss of stamina through vitamin deficiency can be avoided.

'Esdavite' Pearls, the product of extensive nutritional research, provide definite quantities of six essential vitamins. A normal adult requires only one of these soft gelatin capsules daily. Each pearl contains:

Vitamin A.....5,000 U.S.P. units
Vitamin B_1 (Thiamine hydrochloride)...1 mg. (equivalent to 333 U.S.P. units)
Vitamin C (Ascorbic Acid).....30 mg. (equivalent to 666 U.S.P. units)
Vitamin D.....500 U.S.P. units
Vitamin G or B_2 (Riboflavin).....2 mg.
Niacinamide (nicotinic acid amide)....10 mg.

Supplied in boxes of 25 and 100, and in lots of 1000. Sharp & Dohme, Philadelphia, Pa.

1. Jolliffe, N., McLester, J. S., and Sherman, H. C.: J. A. M. A., 118:944, 1942.
2. Lusk, J. M.: Science, 94:31, 1941.

'ESDAVITE' PEARLS

THIAZOINT
10% SULFATHIAZOLE OINTMENT (HART)
A valuable aid in controlling pyogenic infection in wounds and minor surgery. Useful as an adjunct to the usual surgical procedures in: Contaminated and Acutely Infected Superficial Wounds and Burns; Boils and Carbuncles; Varicose, Diabetic and Decubitus Ulcers.
Supplied in 1-oz., 1-lb. and 5-lb jars.

THIAZINC
SULFATHIAZOLE-CALAMINE CREAM (HART)
A greaseless cream which dries rapidly and forms an adherent, slightly astringent film. For the treatment of Impetigo and Other Superficial Skin Infections of Coccal Origin.
Supplied in 1-oz., and 1-lb. jars

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SULFATHIAZOLE-SALIGENIN EAR DROPS (HART)
Bacteriostatic, Analgesic and Dehydrating. Useful in the treatment of Acute Otitis Media, Otitis Externa, Chronic Middle Ear Suppurations and similar conditions.
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HART NASAL JELLY
The original water soluble Ephedrine Nasal Jelly. Relieves nasal congestion promptly and peasantly. Particularly convenient for ambulant patients.
Supplied in nasal tipped tubes.

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Supplied in 4-oz., pint & gallon bottles.

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COD LIVER OIL OINTMENT (HART)
Stimulates epithelization and promotes healing with minimum scar formation. Valuable in the treatment of Burns, Wounds, Abrasions and Varicose Diabetic and Decubitus Ulcers. An excellent means of applying U.S.P. Cod Liver Oil without its unpleasant features.
Supplied in 1-oz. tubes and 1-lb and 5-lb. jars.

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employees complained about irritation of the nose and throat, as well as the thick blue smoke present in the workers' environment. Within four hours, two employees were violently ill and were taken home. Vomiting, chest pains and shortness of breath were the chief symptoms at this time. The chest symptoms increased in one worker, and within four days this worker died of a severe chest involvement. This case again emphasizes that cadmium is a very toxic element and that cadmium plated steels should not be welded, heated, brazed or burned unless the job is well controlled. Such operations must be done in conjunction with properly designed and properly maintained local exhaust systems, for cadmium is more toxic than lead.

—DR. LOUIS W. SPOLYAR, Director, Indiana Bureau of Industrial Hygiene, in *Industrial Hygiene*, November, 1943.

COMMENT and OPINION

IT IS encouraging to observe that of the thousands of veterans already released from active service (over 600,000 since September 16, 1940), practically all of those entitled to re-employment in their old jobs and desiring such reinstatement have been reinstated without delay. Employers generally have made liberal interpretations of the Act and have done everything possible to carry out their obligations. Where veterans, for various reasons, could not be reinstated in their old jobs, employers have made every effort to adjust them to other jobs in their plants or have helped them find other work opportunities. In only one case has it been necessary to refer a case to the U. S. District Attorney, and, in this instance, when the employer was informed that the papers were being prepared for trial, he agreed to reinstate the worker and paid $648 in back wages.

—From "Demobilization, Rehabilitation and Re-employment of Veterans," by COL. J. N. ANDREWS, Re-employment Division, Selective Service System, presented at the Eighth Annual Meeting of the Industrial Hygiene Foundation, Pittsburgh, November 10, 1943.

W. E. OBETZ of Columbus, medical investigator for the Ohio State Industrial Commission, speaking before the Rubber Section said that dermatitis in the synthetic rubber industry "is either impossible or of little importance." He said: "It is a generally safe conclusion, however, to assume that wherever chemicals are handled, conveyed, or mixed there is a possibility of skin irritation among the persons employed. So far as is known, only a comparatively few cases have developed, considering the number of persons engaged in this occupation. The small exposure probably is due to the fact that much of the process, as far as conveying and mixing the chemicals is concerned, is entirely enclosed in a network of tanks, pipe lines, and similar equipment. From the tank car until coagulation has been accomplished the process is almost entirely enclosed and the chances of exposure occur only when there is a leak in a pipe line, a defective valve, or a disabled pump. After coagulation takes place, the washing, drying, and pressing operations provide opportunities for exposure, especially to fumes and vapors thus liberated." DR. OBETZ said a study of 27 claims in one of the larger plants in Ohio, heart of the nation's rubber manufacturing industry, showed only mild effects. In only three of the cases, he said, was there disability of more than seven days. In two claims the disability was nine days each and in the third, 12 days. He continued: "It is evident, therefore, that the cost of compensation was negligible and the medical expense was very small, many of the cases being seen at the plant only once or twice. Distribution of cases as far as part of the body involved shows that dermatitis appeared chiefly on the exposed surfaces—hands, forearms, face, neck, and arms. The type of eruption as described in the medical reports indicates that it appeared chiefly as a rash or erythema. The treatment prescribed by the attending physician consisted chiefly of simple lotions or ointments to which the dermatitis yielded readily, apparently without any complications."—DR. OBETZ'S conclusion was that the manufacture of synthetic rubber occasionally causes dermatitis owing to exposure to various chemicals, especially styrene. In the 27-case study, janitors made up the largest group—nine of them having claims filed in their behalf. Seven utility men made up the next largest group, while "solution mixers" among the 27 cases studied numbered only three.

—From "Chicago Host to Safety Council," by F. J. VAN ANTWERPEN, in *Chemical & Engineering News*, October 25, 1943.

The Accident-Prone

GREAT BRITAIN, with her need of utilizing every ounce of manpower, has accumulated extensive data on the proneness to accidents of the 'industrial misfit.' It has been found that persons who are poor in their response to what are technically called 'aesthetokinetic tests,' involving coordination of muscular movements with stimuli received through the medium of the eye or the ear, tend to have an excessive number of accidents, compared with those whose reactions are more satisfactory. The validity of these tests has now been sufficiently established, as they have been applied to several score thousands of workers from various types of industries—shipyard workers, aircraft mechanics and transport workers. Those who were below the average in the tests had an average accident rate 48%

higher than those who were above it, while the accident rate of the worst 25% was 51% higher than the remaining 75%."

—From an article by A. WYN WILLIAMS in *Forbes* (6-15-43); digest in Connecticut General's *Notes & Quotes*, December, 1943.

Nutrition

THE Westinghouse plant at East Pittsburgh helped cut accidents 30% by serving snacks of good basic foods between meals. . . . IN A LARGE industrial test, milk and fruit were served to workers. During the months when food was given, production increased 4%—errors decreased 8%. . . . PRODUCTION increased 10% in first two weeks after Avondale Mills in Alabama set up government recommended food service. . . . THE Thermoid Company gave 1500 employees a free pint of milk during a five-minute recess. Results: 30% decrease in accidents — increased production — absenteeism down. . . . "THE most practical and economical way to save time lost from illness and most accidents is to see that the workers get the right food at the right time. I saved $24,000 the first 14 months after I hired a dietitian. . . ." says JOSEPH BARTHELMEW, of Barthelmew Construction Company, San Francisco, California.

—War Food Administration Release.

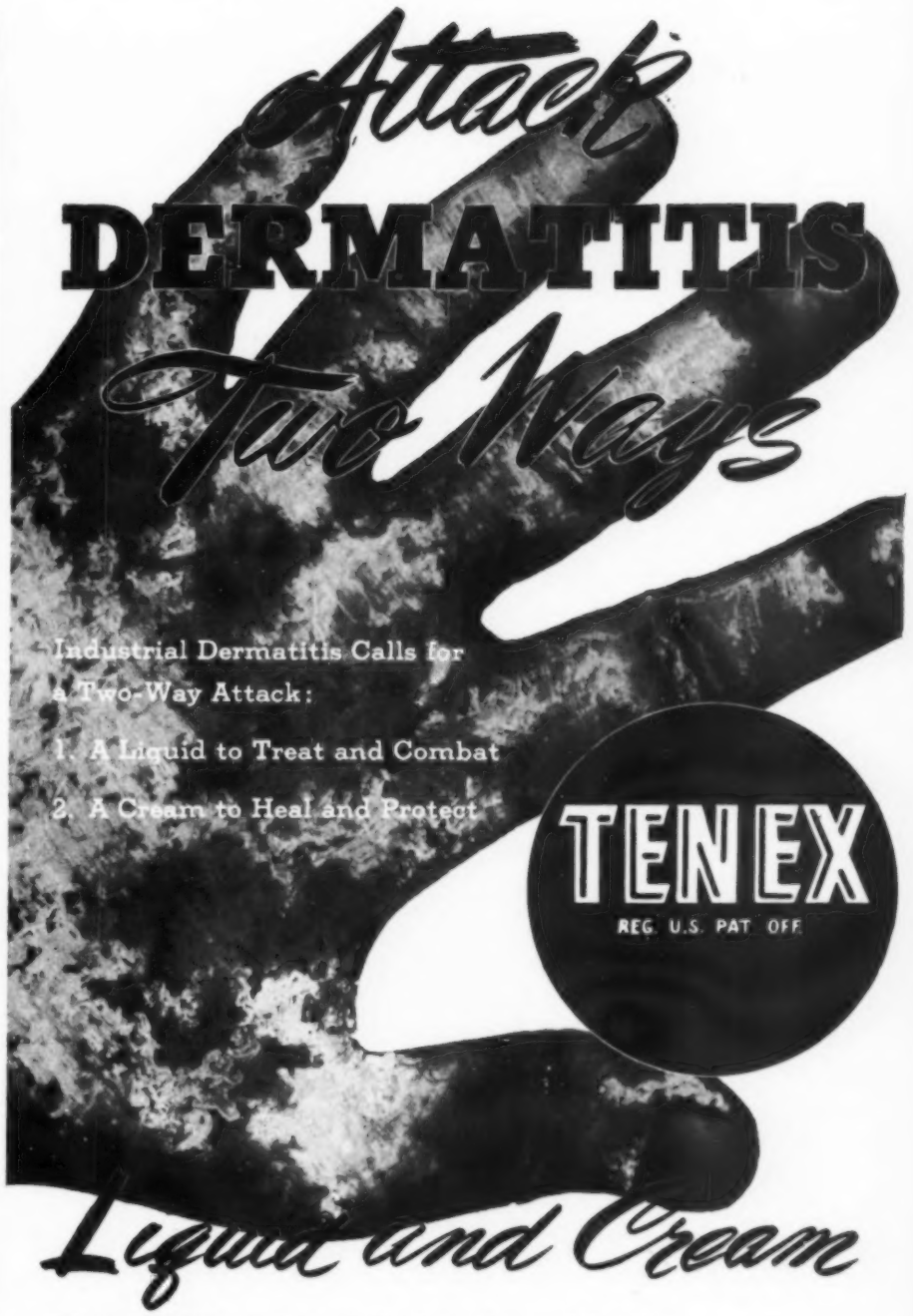
Progress in Placement

VERY considerable progress has been made in the proper and safe placement of physically handicapped workers. No longer is the one-eyed, one-legged, deaf, or blind worker prohibited from doing productive work. Also men with elevated blood pressure, hernia, heart murmurs, varicose veins and related conditions are being placed at work they can do safely and efficiently, under medical supervision when so indicated. It is an adopted procedure to employ workers with syphilis in other than toxic exposures, providing they take the necessary treatment, and have no infectious or disabling complications. Many of our plants now have a rejection rate of less than 1% of all applicants, and are finding, as has been shown before, that as a group, the physically handicapped employees work more faithfully and productively than physically grade A employees. It is thought that this fact will play an important role in postwar personnel policies.

—From "Results of an Active Health Program in Munitions Industries," by SURGEON R. H. FLINN, U. S. Public Health Service, presented at the Eighth Annual Meeting of the Industrial Hygiene Foundation, Pittsburgh, November 10, 1943.

Mass Hysteria

CIGAR ROLLER disabled; foreign odor; mass hysteria; degenerative brain changes; causal connection: Plaintiff, a skilled worker in a cigar factory, was awarded compensation by the department of labor and industry. The employer appeals. Owing to an odor like gasoline, a sweet odor, causing nausea, vertigo



TENEX LIQUID penetrates to the deeper layers of the skin, carrying a fungicide to destroy the causative parasite. Containing Chlorthymol, Menthol, Thymol, Phenol, Benzocaine, Oil Wintergreen, Salicylic Acid and Benzoic Acid, it exfoliates dead and diseased tissue containing fungus spores, tends to allay itching and burning. Used effectively 14 years for fungus skin infections of external origin. Use TENEX TAR CREAM as companion treatment to heal and protect. Today, write for Free sample bottles and literature.

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Please send me Free Professional Samples of Tenex Liquid and Tenex Tar Cream with Literature.

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When So Many Patients Must Remain Ambulatory

The many associated war activities in which our civil population is engaged makes it necessary that patients be enabled to carry on their duties whenever possible. Pruritus vulvae, a source of torture and embarrassment, need not be incapacitating. Through the use of Calmitol Ointment, complete and prolonged subjective relief is obtained. Calmitol is dependably efficacious, regardless of the cause underlying the pruritus. Thus patients may be kept comfortable and ambulatory while the often prolonged diagnostic search required for etiologic eradication is being conducted. Physicians are invited to send for samples.

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CALMITOL
THE DEPENDABLE ANTI-PRURITIC

Calmitol exerts its specific antipruritic influence by blocking cutaneous receptor organs and nerve endings. Its active ingredients are camphorated chloral, menthol and hyoscyamine oleate, incorporated in an alcohol-chloroform-ether vehicle. Calmitol is protective, bacteriostatic, and induces mild active hyperemia.

and headache, some 30 girls collapsed within the same area of defendant's plant. An industrial hygienist concluded the collapse of the employees was caused by mass hysteria. Plaintiff's symptoms have persisted since the occurrence and lead to a diagnosis of degenerative brain and spinal cord changes attributable to the incident. This court concludes that plaintiff, in the course of her employment suffered an injury which incapacitated her for the work in which she was engaged. Award affirmed. *Rainko* v. *Webster-Eisenlohr, Inc.* Michigan Supreme Ct. Decided September 7, 1943.

—*Industrial Hygiene Digest*, October.

This Paranoid World

YES, honored guests, you have come a long way, with radio and television and zoot suits and crooners and lady riveters and two World Wars, and the reincarnation of Nero and Tiberius Caesar and Caligula in the persons of Hitler and Hirohito and Mussolini. You have witnessed many strange events. Strangest of all perhaps is that you have lived to hear the name of Thomas Jefferson booed at a Democratic National Convention and to see the Republican Party run a hoarse and disappointed Democrat for the presidency of the United States. Be of good cheer, however, and do not desert us, because this paranoid world needs you and people like you now more than ever in its history.

—R. EMMET KANE, M.D., at a meeting of the St. Louis Medical Society, October 5, in the Society's *Weekly Bulletin*, October 22.

Doctors Serving Industry

AN INDUSTRIAL health program designed to extend facilities to the small manufacturer that are comparable to those provided for large industries by full-time medical service, has been developed by the Los Angeles City and County Defense Council through its Industrial Resources and Production Committee. This committee serves as the liaison agent between industrial plants that need such medical services and the practitioners who render them. It is composed of representatives of the county medical association; the state, county, and city health departments; and industry. "Here is an opportunity for the private practitioner to contribute an excellent bit of constructive work to war production," the medical association's bulletin comments. "In some of the smaller plants such services can be expected to require from one to three or four hours weekly; in the larger plants from one to two hours daily. "These services consist of pre-employment examinations, periodic physical check-ups, consultation with the management upon industrial hazards, and the offering of corrections for those hazards. Compensation will be arranged between the private physician and the management, and upon a monthly basis depending upon the time and extent of the services."

—*Medical Economics*, October.

Industrial Hygiene Personnel

ON AUGUST 4 recommendations concerning the assignment of industrial hygiene personnel were adopted by the sanitary engineering committee which will allow each state with an industrial population of less than 500,000 one industrial hygiene engineer, states with 500,000 or more workers two such engineers, and one such industrial hygiene engineer for each additional 500,000 workers. The action stemmed from resolutions presented at the War Conference on Industrial Health in Rochester, New York, in May, which urged that consideration be given to the present shortage of industrial hygiene personnel. At a meeting in Washington in July J. J. BLOOMFIELD, senior sanitary engineer, division of industrial hygiene, National Institute of Health, Bethesda, Maryland, stated that there is a total of 257 professional industrial hygiene personnel in all of the state and local units, of whom 59 are officers on loan from the public health service. The problem of securing engineers and chemists was the major need considered at this meeting, since there are only 187 now in service in these units. It was pointed out that the loss of even one man from the division of industrial hygiene in most states would seriously jeopardize the program. Under the new set-up the procurement and assignment service for sanitary engineers of the War Manpower Commission will now operate under its new definition of essentiality, so that only those engineers declared available under the new definition of essentiality would be permitted to accept a commission in any one of the services. It is felt that the statistical basis used, which allots a certain number of engineers according to the size of the labor force in each state, should work no hardship on any industrial area, with one exception. This exception is the county of St. Louis, and the committee felt that rather than complicate its new simple definition, and since only one place was involved, it would give favorable consideration to making an exception in the case of St. Louis

Occupational dermatitis, or "Factory Hands" to the workers who suffer from it, often *originates right in the washroom.* Workers in a hurry to get home will use strongly alkaline soaps to clean their hands quickly . . . or even worse, will resort to the use of harmful industrial solvents, such as those encountered in the course of their work. This practice is in itself harmful to the skin, and at the same time predisposes the skin to inflammation by industrial irritants.

Providing workers with a speedy, *safe* skin cleanser is therefore essential to the success of any program for the control of industrial dermatitis. pH6 is such a cleanser. It quickly removes all common types of industrial grime . . . dirty grease and oil, printing inks, solvents, salves and even paint which has been on the hands as long as four hours or until it sets. At the same time, it causes no burning, dryness or cracking, even tends to reduce chapping, and can usually be applied without stinging to normal hands which have been nicked and cut.

For exceptional cases of deep-pore grime, the cleansing action of pH6 is hastened through the use of pH6 Non-Abrasive Scrubber. Its effectiveness in combatting "Factory Hands" is greatly enhanced by specially developed dispensing methods, so convenient that workers do not hesitate to use these materials.

A free circular gives complete technical data on pH6 and also describes the special dispensing methods, adaptable to all wash-room conditions. Write for a copy today.

TERRITORIES AVAILABLE for individual representatives. Write stating background.

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TRADEMARK

a new kind of industrial skin cleanser which:

1. **Cleans hands quickly and thoroughly.**
2. **Will not harm the skin.**

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NO WATER BATH
NO HEATING

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CLINITEST
A TABLET COPPER REDUCTION METHOD

AS SIMPLE AS THIS: Just add 1 Clinitest Tablet to proper amount of diluted urine in test tube. Allow for reaction. Compare with color scale.

That is all—

No powder to spill—No measuring—Test in a matter of seconds! . . Available through your prescription pharmacy or medical supply house.

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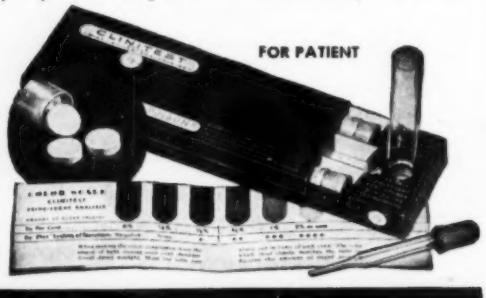

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ELKHART, INDIANA

County, allowing the county to have one industrial hygiene engineer in addition to the chief sanitary engineer already allowed under the original ruling. It would seem, therefore that the engineering personnel now operating in the various state and local industrial hygiene units have fair assurance that they will continue at their present posts, at least as far as the industrial hygiene engineering needs of the war agencies are concerned. The army, navy and public health service and maritime commission are at present not recruiting any additional personnel in the field of industrial hygiene engineering, but in the future should any one of these need additional personnel of this type such personnel would have to clear first through the procurement and assignment service for sanitary engineers of the War Manpower Commission.

—*J.A.M.A.*, November 13, 1943.

Washington State

MEMBERS of the industrial hygiene staff, Washington Department of Health, have assisted in extension courses in "Industrial Hygiene for Nurses" held at Spokane and Seattle. A regular course in "Duties and Functions of the Nurses in Industry" was given at the University of Washington recently under the direction of MRS. OLIVE WHITLOCK KLUMP. Industrial nurses of the state, having organized an Industrial Hygiene Nurses Section of the State Nurses Association, are now stimulating local districts to organize such sections. The State Federation of Labor has recently passed a resolution favoring adoption of the Statement of Policy of the State Advisory Committee on Industrial Hygiene, which recommends physical examinations. This committee, appointed by the Governor, has equal representation of labor, management, and the medical profession. The State Advisory Committee recommends: "(1) That it is the duty of labor, management and the medical profession to develop jointly a plan which will insure the worker being placed in a job he is physically and mentally able to do, and a plan which will provide a periodic appraisal of the health of the worker on the job with the idea of maintaining the continuous health of the worker. (This becomes most important in view of the fact that Washington now has 500,000 workers in essential war industries.) (2) That immediate steps be taken by labor-management committees of all war industries to initiate such a plan. In addition, labor-management committees shall take immediate steps to protect the health of the worker and his family by eliminating health hazards in the physical plant (environmental hazards, such as heat, light, ventilation, sanitary hazards, dangerous fumes, dusts and poisons) and by eliminating the dangers of contagious disease such as tuberculosis, syphilis and other infectious diseases. Such committees will need to work out details to prevent information on the health and physical status of the worker being used to discriminate against any individual or group, and yet which will insure maximum production. When such labor-management committees have agreed to the principles of the plan, the medical profession should be invited to assist in developing the plan. (3) That the program must be inaugurated and operated by the people producing war goods."

—*Industrial Hygiene*, November, 1943.

Federal Workers' Health Program

THE U. S. Public Health Service, through its Hospital Division, is establishing an enlarged health program for Federal employees. A special appropriation of Congress made possible the organization of this service in July, 1943. Under the direction of SENIOR SURGEON J. L. VAN ACKEREN, Medical Officer in Charge of the Dispensary, and the immediate supervision of SURGEON (R) BEATRICE B. BERLE, Medical Director of the newly organized Employees' Health Service, a staff of psychiatrists, psychologists, psychiatric social workers, public health nursing consultants, health education consultants, and nutrition consultants has been appointed. This service has been established to provide coordinating and consultative service regarding methods and standards for operating health programs within government agencies, and to assist the employees of such agencies through: (1) mental hygiene and psychiatric consultation, diagnosis, and treatment; (2) examination of employees and diagnosis for tuberculosis; (3) public health nursing consultation; and (4) health education programs, and consultations. The program will first become effective in the agencies to which medical officers of the Public Health Service have already been

How safe and effective is TAMPAX?

Intensive 5-year study of 2340 cases answers important questions on use of Tampax Menstrual Tampons

THE results of a comprehensive investigation* into the safety and efficacy of Tampax menstrual Tampons provide valuable data for the physician's consideration. In this project, studies of bacterial flora and hydrogen ion concentration, vaginal mucosal biopsies and glycogen determinations were undertaken, in addition to gross examinations . . . to answer the following questions:

Do tampons cause cancer, erosion, or vaginitis?

No production of irritation or discharge, vaginitis or cervicitis was found in one study group of 218 women employing tampons regularly for one year or over.

Do tampons block the flow?

Tampons do not block the flow. On the contrary, they actually act as a wick to draw blood away from the cervix.

Do tampons irritate the delicate vaginal tissue?

Careful and repeated observations on over 500 private patients using vaginal tampons during menstruation failed to reveal any instance in which harm resulted.

Should tampons be worn only at the start and end of menstruation?

In 110 young nurses (another study group), 95 per cent used tampons with satisfaction all through menstruation. Only 5 per cent could not use tampons in the middle of the period, and in these cases the flow was excessive.

Do tampons overcome the problem of menstrual odor?

Definitely yes, as shown by this study and by numerous investigators.

Are tampons comfortable and do they help the psychological attitude toward menstruation?

The patient does not even know that a tampon is present in the vagina if it is inserted sufficiently deep. A large number of patients have voluntarily stated, without being questioned, that premenstrual and menstrual tension disappeared following the adoption of tampon hygiene.

* Karnaky, K. J.: West. Jnl. Surg. Obstet. and Gyn., Vol. 51, p. 150, April 1943; condensed in Cur. Med. Dig., July 1943, p. 43.

TAMPAX INCORPORATED, PALMER, MASS.

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The smooth demulcent action of Metamucil prevents straining and provides local protection.

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Metamucil promotes easy evacuation. Its pleasant palatability is particularly important in pregnancy.

SPECIFIC INDICATIONS FOR "SMOOTHAGE"

Although the Metamucil "Smoothage" treatment of constipation is widely employed for everyday corrective regulation, there are many specific indications (as herein illustrated) in which this bland, non-irritating method of reestablishing normal bowel function has been found of outstanding value.

It is important to note that whether the bowel condition is spastic, atonic or ulcerative, Metamucil supplies a protective, soothing action to the inflamed mucosa and facilitates elimination by the production of a soft, plastic, easily expressed stool.

Special diets

In low-residue diets, as in the treatment of obesity, Metamucil provides bulk without irritation.

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Where lack of exercise is a predisposing factor, Metamucil initiates reflex peristalsis and reestablishes normal function.

METAMUCIL

—a highly refined, purified and concentrated vegetable mucilloid prepared by a special Searle Research process from the mucilaginous portion of Plantago ovata (Forsk). Mixes intimately with the bowel content, softens fecal residue, protects intestinal mucosa from chemical and mechanical irritation.

Metamucil is soothing and demulcent—has a gentle stimulating effect upon the intestinal musculature.

Metamucil is the registered trademark of G. D. Searle & Co.

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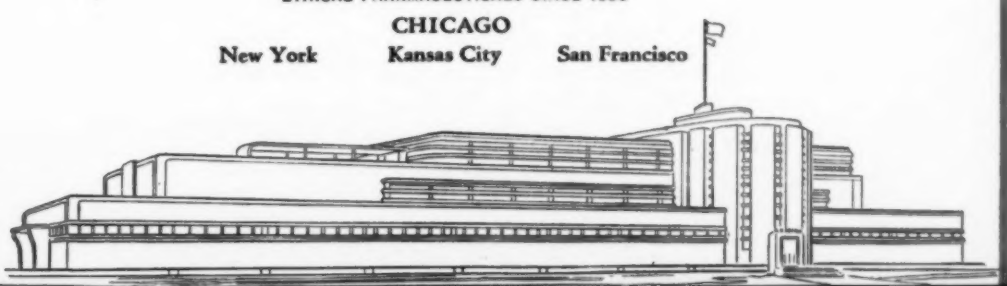

SEARLE

RESEARCH IN THE SERVICE OF MEDICINE

OUR STERILIZER IS ALWAYS Shiny and Bright
BRILLIANT chrome plating of Pelton portable exteriors, and cabinet trim, should be preserved by polishing regularly with a soft cloth, preferably flannel.
Baked finish of cabinet models should be rubbed with a good automobile polish on soft cheesecloth. Cabinet tops are in fused porcelain. Clean them as you would clean fine bathroom equipment.
THE PELTON & CRANE CO., Detroit 2
Established 1900
PELTON Sterilizers
ARMY NAVY
FREE ON REQUEST — Illustrated booklet "Precision Technique," with suggestions for sterilizer and instrument care.

assigned, including the WPB, OPA, Department of Commerce, Treasury Department, and the OWI. The chief medical officers in each agency are in charge of the immediate management and direction of the health program of the agency. The nurses within these agencies are under the general administrative direction of the chief medical officer, and under the nursing supervision of a supervisor of nurses. In the agencies where there is no medical officer, requests for consultation and guidance in the development of a health program may be made by the nurses in the emergency room, or personnel officers.

—*Industrial Hygiene*, Current News of Official Industrial Hygiene Activities, November, 1943.

Women Welders

THE instructor of a welding school at one shipyard says that from his experience it takes two weeks longer to train a woman welder than a man. (Other yards, it is said, report women learn faster.) He feels that girls, when they put in a full eight-hour day, tend to "give out" after five to six hours. "It's heavy and hard, and they can't take it," he says, yet goes on to say that some very small girls make good welders. In a yard where a woman holds the footage record for welding, the foreman reports that, in general, relatively more women than men have become exhausted on the job. One of the foremen said it is true that women tack welders cannot do some of the heavy labor work which men tackers formerly did. On the whole, however, he seems very satisfied with the welding work being done by the women. The Women's Bureau finds it isn't so much the women's lack of skill or ability to do welding itself, as it is the physical conditions surrounding the job that is responsible for some women "petering out" or not being able to do the full job. Welding involves much climbing and weight lifting. Frequently the women welders must carry their welding lines up and down stairs and ladders and along catwalks. In most yards the smallest section of welding hose is 50 feet long and weighs 35 pounds. Sometimes the women must pull the welding lines out from under several other heavy lines stacked on top of their lines, often several times a day. In overhead welding the lines must be rested on the shoulder to hold them in position, and this also causes a strain. In some enclosed places, welders in addition to their full welding regalia, often heavy and warm, must also wear respirators. This is true when blowers have not been installed to remove the hazard from toxic fumes. Greater hazards may be present in shipyards for welders, since the heavier load of electricity required would give more chance for burns and shock. Women are most effectively used where there aren't these strenuous working conditions. A woman doctor at a large shipyard hospital on the west coast, commenting on these conditions, recommended that the regular welding training course include instructions in weight-lifting methods, methods of coiling line, and of carrying lines and climbing with them. She also recommended a program for physical training of the women welders to condition them to the strenuous work they must handle, as a basic part of all pre-employment programs.

—From an Office of War Information Release.

Penicillin

BECAUSE of numerous requests received by the Army for penicillin, Surgeon General Normal T. Kirk, of the Army Medical Department, explains that the War Department "at no time has either controlled penicillin or received the entire output." The Army's position with regard to penicillin supply is exactly the same as that of the Navy, U. S. Public Health Service, and the Office of Scientific Research and Development, each of which receives a monthly allocation from the War Production Board. General Kirk also explains that the penicillin allocated to the Army Medical Department is intended for the treatment of military personnel and "none of it can be reallocated or released to civilians." Penicillin is a new drug which prevents the growth of infection bacteria. It is being tried out in Army, Navy and civilian hospitals in the treatment of serious types of infections which will not respond to sulfa drugs. The supply of penicillin is limited and distribution is controlled by WPB. This month, according to WPB, the Army will receive 56% of

During and After Pregnancy

The maintenance and restoration of adequate hemoglobin levels in pregnancy, postpartum and lactation are of paramount importance. Precautionary measures to avoid deficiency anemias should include reliable iron medication. Thus, iron reserves needed by mother and child can be satisfactorily provided by the administration of specially prepared iron (easily assimilated ferrous sulphate—plain or with liver concentrate) incorporated in . . .

LOOK AT THE BLOOD
TRADE-MARK

Hematinic Plastules*

THE BOVININE COMPANY ☆ CHICAGO
DIVISION WYETH INCORPORATED

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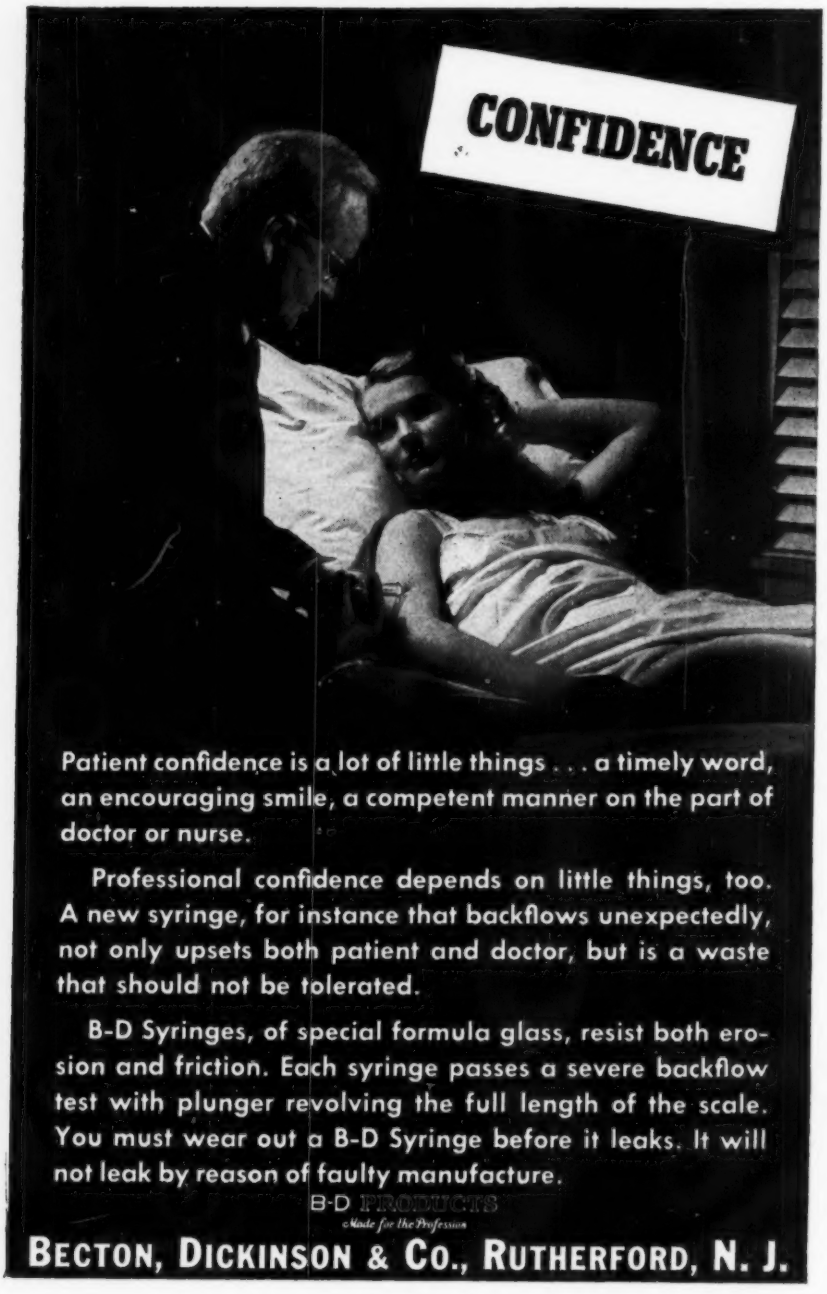
CONFIDENCE
Patient confidence is a lot of little things . . . a timely word, an encouraging smile, a competent manner on the part of doctor or nurse.
Professional confidence depends on little things, too. A new syringe, for instance that backflows unexpectedly, not only upsets both patient and doctor, but is a waste that should not be tolerated.
B-D Syringes, of special formula glass, resist both erosion and friction. Each syringe passes a severe backflow test with plunger revolving the full length of the scale. You must wear out a B-D Syringe before it leaks. It will not leak by reason of faulty manufacture.
B-D PRODUCTS
Made for the Profession
BECTON, DICKINSON & CO., RUTHERFORD, N. J.

the total supply, the Navy 18%, U. S. Public Health Service (for the treatment of Coast Guard and Merchant Marine personnel) 2%, the Office of Scientific Research (for civilians) approximately 15%, with the remainder to the scientific staffs of drug companies for their own research. Though production of the drug is steadily increasing, at present none of the agencies, including the military, receives as much as it needs. Its distribution among military and naval personnel is determined by the Army, Navy, and the U. S. Public Health Service. Distribution of the part allocated to civilians is for clinical research and its assignment is determined by a committee headed by Dr. Chester S. Keefer, Evans Memorial Hospital, Boston. Since the amount of penicillin requested by civilians greatly exceeds the available supply, it has been determined by the Office of Scientific Research and Development that civilian requests must be made through their doctors who should communicate with Dr. Keefer by telephone, telegram or personal letter giving complete details of the case so that he may have an adequate basis for decision.

—OWI Release.

Women

THE medical department is confronted daily by maladjustment cases of all sorts, phobias, fixation ideas and the like, of which the following are illustrations: (1) A girl is assigned to a press job. A few days later she is referred to the medical department by her foreman, complaining of pains here, there and everywhere. In the course of the conversation she mentions that the girl who formerly ran the job is now in the hospital where she underwent extensive surgery made necessary by the reason of this job which "tore her insides loose" etc. Unfortunately we are not in a position to explain to our patient that the girl in question had had a "frozen pelvis" for quite some while, a condition unrelated to her employment. (2) A girl working on a conveyor line for months past, a good operator, complains of dizzy spells. Thinks it is her eyes, had them checked by some local optometrist who fits her with simple lenses and writes us a letter to the effect that the vertigo is induced by the moving conveyor. At first glance, this would appear to be a simple problem, transfer the girl, but there is more to the story. The point is that she was doing splendidly until one certain day when she became quite ill and has been unwell since. Now what happened on that day? From her group-leader and other sources we learn that her girl friend was transferred to a better job in another plant, but that she does not have enough seniority to rate a similar transfer. Her only avenue of escape is through the medical department, hence the sudden onset of vertigo, headache, etc. (3) A woman who has worked in one particular group begins to complain. Her arms and back ache so badly she cannot rest at night. In the course of the conversation, which must be as cagey as a diplomatic duel, we murmur "transfer," whereupon she comes to life and suggests that she would like to try Plant 3. Why Plant 3? It's nice over there and the girls are getting a lot of overtime, whereas her department has been down to four days per week for sometime. We explain to her that her work has been curtailed by reason of a temporary material shortage which will be remedied shortly and the operator decides to stay on her old job. The fact that a woman is in good physical condition at the time of her employment does not necessarily mean that she will continue to enjoy good health. In fact the probabilities are that within a year or so she will have been seriously ill, have undergone a surgical operation, or sustained a serious accident, either at home or on the highway. She may be off work several days or several months and on her return may be so impaired that she will have to be reclassified for limited employment. The General Motors Group Insurance provides that sick benefits shall be paid for a period of 13 weeks, after which they terminate. As soon as the last check is received, she returns, ready for work and usually armed with a statement from her physician that she can now do "light work." The fact that she was performing some relatively simple operation at the time she quit does not particularly enter in the matter. She has been unwell and must be rehabilitated gradually by still "lighter work." To go back on her old job would probably make her "nervous," her nerves "having been shattered" by her recent experience. She is quite willing to do lighter work, but is averse to "lighter pay" commensurate with her new job. One cannot particularly blame the woman; after all, she must eat and with her sick benefits discontinued is looking for some

MEDICALLY CORRECT

M-S-A

SIX FEND TYPES

GUARD AGAINST SCORES OF OCCUPATIONAL DERMATITIS HAZARDS THROUGHOUT INDUSTRY

FEND-A

This water soluble cream protects against dermatitis from excessively staining and adhering compounds, such as in spray painting, pitch and tar, bitumastic paint, and dry metallic dusts. FEND Creams are rubbed well into the skin, care being taken to cover all exposed skin surfaces.

FEND-E

Protects against dermatitis from cutting oils of low water content, carbon tetrachloride, and other chlorinated solvents, kerosene and other petroleum distillates, vegetable and mineral oils. FEND-E water soluble Cream, like all FEND Creams, is easily applied, and readily removed at the end of each work period.

FEND-I

A water-repelling cream, FEND-I affords protection against dermatitis from strong acids and strong alkalies, cutting oils with over 10% water, formaldehyde, phenols, metals and metallic salts. FEND-I rubs in well, but leaves a slightly more oily film on the skin than FEND-E.

FEND-L

Here's a FEND water soluble Cream that protects against ultra-violet and infra-red rays, as in welding or soldering operations, and long exposure to sunlight.

FEND-X

This is a modern, industrial cold cream which rubs well into the skin and serves as a skin conditioner. Ideal for use after work is completed and skin has been thoroughly cleansed. Prevents cracking of skin. FEND-X is also recommended for coating the nasal passages to prevent irritation and nose-bleed prevalent in many operations such as electroplating, welding and soldering of certain materials.

FEND-O

FEND-O provides safe barrier protection in handling gun powder and explosives (such as tetryl and T.N.T.), coal tar derivatives, wood preservatives, and solvents such as cold water, alcohols and acetone, without interfering with the normal action of the skin or skin glands.

Doctors—Write for complete and authoritative Fend Brochure—It will interest you.

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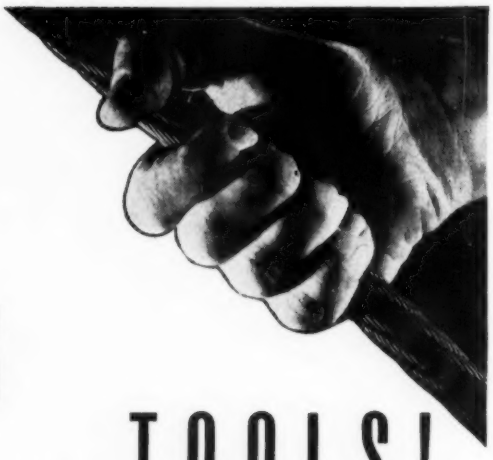

HANDS *are* TOOLS!

Hands are needed to push this war. Hands to shape the planes and build the ships. Hands to draw the blueprints for the machines that make the bombsights. Hands to produce food and arms for the men up front and to turn the wheels for all the supporting civilians at home.

Hands required by the million—and we're short-handed! Isn't it good sense then to protect those we have?

Some of the industries in which **Sheeldskin** is helping to protect hands against irritating acids, grease and grime: steel, ammunition, shipbuilding, radio tubes, meat-packing, wax paper, phenolic resins, lacquer and airplane parts.

Hands are tools! Protect them with Sheeldskin.

BREON

George A. Breon & Company

Pharmaceutical Chemists

KANSAS CITY, MO.

New York Atlanta Los Angeles Seattle

source of income. On the other hand the employer has a job to do, work to get out, schedules to meet and requirements to satisfy. This applies very particularly where the woman has been in an automobile accident and has an un-united fracture or one which should have more time. We see a considerable number of rather bad reduction jobs, with deformity, mal-union, adhesion of tendons to the fracture area, and consequent loss of use. It is our practice to take an x-ray film of each and every joint involved for our own records and our own protection. Where we do not feel the patient to be capable of doing a reasonable day's work because of her condition, we refuse to permit her to return to work until she is further improved. Women who are still on crutches are not put back to work until they have enough bone union to permit them to walk unaided or at least with a cane.

—From "Women in Industry," by FRED B. WISHARD, M.D., in Indiana State Board of Health's *Monthly Bulletin*, October 1943.

That Kitchen Penicillin

FROM *Hazelton, Pa., Standard-Sentinel*, November 11: "How precious life-giving penicillin is being produced in the kitchen of his home 'at five cents a plateful' was explained by DR. JULIUS A. VOGEL, plant physician for the Jones & Laughlin Steel Corporation. Although a comparatively crude type, he said his penicillin has proved more than effective in treating external infections, and that any properly equipped physician can 'grow' his own supply. He cited more than a score of cases where complete cures were effected with his 'kitchen penicillin,' as he spoke before 500 executives and medical directors of leading American industries at the eighth annual meeting of the Industrial Hygiene Foundation at Mellon Institute. 'All surface pyogenic infections can be treated by the green mold culture, produced at five cents a plateful,' he remarked, 'and it doesn't require the services of an experienced bacteriologist.' DR. VOGEL'S penicillin is grown in covered glass dishes about the size of saucers, the medium being ordinary cornstarch cooked for a half-hour at 400°. The greenish mold spreads over pieces of gauze and within four days is ready for use on infections. About a dozen 'patches' can be taken from each dish. The gauzes can be used anywhere from the fourth to the twelfth day after the penicillin is started. Growth of the mold continues after the gauze is placed on the patient. Bandages are fastened securely but are not made airtight, as penicillin needs oxygen to generate'." . . . FROM *Chicago Tribune*, November 12: "Penicillin, new quick cure for syphilis and other dread blood conditions, cannot be produced in 'an ordinary kitchen,' DR. EDGAR B. CARTER, bacteriologist for Abbott Laboratories, said in commenting on a statement by a Pittsburgh physician that he had so produced it. 'He could not make penicillin unless his kitchen were practically a laboratory. The drug is made from a common mold but to make it pure one must have absolutely sanitary conditions. If one can't grow the mold in a germ-free environment, the penicillin either would be destroyed by the enzymes in other bacterial growth or would be impure. It certainly would not do for introduction into the veins.' DR. IRVING S. CUTTER, dean emeritus of the Northwestern university medical school, agreed that pure penicillin could not be produced except under more ideal conditions than are found in kitchens. He said it is also too costly to attempt producing the drug that way."

Dangers in Mass X-Raying

THE greatly increased use of the chest x-ray in mass surveys of industrial workers and other groups requires continuous vigilance to safeguard from over-exposure to roentgen rays both the operators of x-ray units and the persons being examined. Lead screen protection for the operators, proper spacing and careful checking of equipment, and frequent blood examination of operators are necessary precautions. The dangers of such exposure have been thoroughly studied by the Tuberculosis Control Section, States Relations Division, U. S. Public Health Service. To aid the technicians of this section, a blueprint chart has

"Let Jimmy tackle her... HE'S on NATURAL B"

AXIOMATIC in experimental rat circles are these 2 facts concerning comparative B-vitamin therapies:

1. Completely satisfactory results are *not* obtainable with individual crystalline vitamins or synthetic mixtures.
2. Fully effective results follow the use of *natural* vitamin B complex.

These conclusions are further emphasized by the successful use, in clinic and private practice, of Elixir B-Plex—the *natural* vitamin B complex.

A pharmaceutical of John Wyeth & Brother, Division WYETH Incorporated, Philadelphia.

ELIXIR B-PLEX *Wyeth's*

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THE NATURAL VITAMIN B COMPLEX

8 FLUID OUNCE BOTTLES

RELIEVES ITCHING AND PAIN... PREVENTING REINFECTION

in

Skin Affections

Pruritus

Hemorrhoids

NUZINE OINTMENT

By relieving the pain, itching and burning of dermatologic lesions, hemorrhoids and associated conditions, Nuzine prevents the reinfection caused by scratching and retards spread of the affection.

The soothing, analgesic, decongestive action of Nuzine permits rest and relief, which is necessary to the healing process.

Nuzine is supplied in 1-oz. tubes with special applicator and an easily removed label. Also in 1 lb. jars.

FORMULA:

Guaiacol	1.66
Oxyquinoline Sulphate	0.42
Zinc Oxide	2.50
Glycerine, C. P. . .	1.66
Lanum (Anhyd.) . .	43.76
White Petrolatum . .	50.00

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900 NORTH FRANKLIN STREET • CHICAGO, ILL.

been prepared showing the proper spacing of the mobile photofluorographic equipment now being used in the Public Health Service tuberculosis case-finding program. Copies of this chart and detailed information can be obtained upon request to SENIOR SURGEON HERMAN E. HILLEBOE, Tuberculosis Control Section. A timely warning on the "Danger from Fluoroscopy" appearing in an editorial of *Minnesota Medicine*, June, 1943, written by K. WILHELM STENSTROM, PH.D., Professor of Biophysics, University of Minnesota, has been reprinted in the November, 1943, *Tuberculosis Abstracts*, published by the National Tuberculosis Association, 1790 Broadway, New York City. This editorial states that "roentgen rays from fluoroscopic units have caused innumerable sequelae to both patients and physicians, and serious damages often still result in spite of the knowledge that now is available." The rules for safety in avoiding both electric shock and roentgen ray exposure are specified.

—*Industrial Hygiene*, November, 1943.

Wartime Conference

A WARTIME conference on industrial medical problems was held at Cincinnati, November 3 and 4, by Hercules Powder Company for the company's plant physicians and executives. In addition to the Hercules men who presented papers on medical problems encountered at the company's chemical and explosive plants, and led the round-table discussions, the following company men were present: A. B. NIXON, vice-president; DR. L. C. MCGEE, medical director of Hercules; J. B. JOHNSON, assistant general manager, Explosives Department; A. LANGMEIER, director of operations, and PAUL MAYFIELD, assistant general manager, Naval Stores Department, all of Wilmington.

Words

THE following appeared in a recent issue of the *St. Louis Post Dispatch*: "The story of Creation in Genesis was told in only 400 words; the great moral code the Ten Commandments required only 297 words; Lincoln's immortal Gettysburg speech only 266 words; the Declaration of Independence stating a new concept of freedom required only 1,321 words. The OPA's declaration of a reduction in price of cabbage seed required 2,500 words."

War Workers' Hands

RAY SHAW, the nationally-known sculptress of famous hands, is making a study of the problems of hands of workers in war industries with emphasis on women's hands. Having done much writing on the subject of hands, and feeling that women who are contributing to the war effort should be more informed on the protection and care of their hands, she is now preparing a book on hand hazards and how to avoid them, stressing the importance of hand and finger exercises to reduce tiredness and strain and giving advice on the care and beauty of the hands—a matter with which women everywhere are vitally concerned.

New Hospital

DR. MOREY PARKES, head of Curtis Propellor Division's medical department at Caldwell, New Jersey, announces the opening of the company's new industrial hospital at the Caldwell plant. The facilities include x-ray and fluoroscopic equipment, laboratory facilities for blood counts and blood typing; an operating room, and separate wards for men and women. "It is the department's wish to direct every employee in every way possible to the best approach to health," DR. PARKES said. "Chest x-rays will be done whenever it may be deemed necessary; but not x-rays of stomachs and other organs. Our laboratory facilities for matters such as blood counts, urinalysis and the like are also available to aid in the diagnosis of an ailment."

—*Passaic, N. J., Herald-News*, November 22.

Women in Ceramics

MAJOR CHRISTOPHER LEGGO, M.D., Chief, Division of Industrial Hygiene, Department of Health, State of Ohio, discussed the value of women in the ceramic industry. He stressed the fact that in an over-all picture women are as efficient and attentive to work as men. In addition, they are steadier while at work and more satisfied with their work. In discussing industrial diseases, he pointed out that cleanliness is the basis for health. If adequate facilities are provided for employees to keep clean, there will be no industrial diseases. Coupled with health in the factory, is community health. The plant that cooperates with community authorities

"BILLIONS FOR DEFENSE"

against the Common Cold

Each Oravax tablet contains **50 billion** *killed organisms of a wide range of bacterial species, providing broad protection against the secondary invaders.*

Business is at War... and man-hours of working time are the very essence of victory. The incidence, severity and duration of the common cold—greatest single cause of disability—can be definitely reduced by the Oravax program of colds protection.

ORAVAX

Brand of Oral Catarrhal Vaccine

Effectiveness of *oral* vaccination with Oravax as a prophylactic measure has been demonstrated in large groups, under supervised control, in various parts of the country. The high percentage of success is shown by the following excerpts from published reports:

Complete freedom from colds in 81.92% of Oravax group; 12.34% of control group.

J. M. A. Georgia *28:* 332-334 (1939)

Number of severe colds and total days' illness from severe colds in Oravax group only one-fifth that in control subjects.

Journal-Lancet *60:* 319-324 (1940)

70.2% decrease in number of colds in group receiving Oravax; 7.2% decrease in group given placebos.

Indust. Med. *9:* 530-533 (1940)

Oravax is inexpensive, painless, free from severe reactions. Suggested dosage is one tablet daily for 7 days; then one tablet twice weekly throughout season when colds are most prevalent.

Oravax is available at prescription pharmacies in bottles of 20, 50 and 100 tablets. Large-scale vaccination of industrial groups may be accomplished more economically by purchasing the tablets in bulk packages. Write for complete details of the Oravax program, including clinical reports and a cost estimate covering vaccination of the group under your care.

I.M.

The Wm. S. Merrell Company, Cincinnati 15, Ohio
Gentlemen: **Please send complete information on the Oravax program of colds protection.**

Dr. _____

Please print or write plainly

Industrial Affiliation _____

Address _____

City _____ *State* _____

Trade Mark "Oravax"
Reg. U. S. Pat. Off.

MERRELL
115th Year

THE WM. S. MERRELL COMPANY · CINCINNATI, U. S. A.

WHY MURINE

A BUFFERED ISOTONIC COLLYRIUM IS IMPORTANT IN INDUSTRIAL HYGIENE

•

Solutions that would be entirely harmless to the skin surfaces may injure the eye severely, due to osmotic pressure changes within the membrane cells. Pure water or hypotonic solutions used in the eye favor development of edema or swelling, while solutions of a higher salt concentration than the tears may cause a shrinkage or loss of water from the membrane cells.

It is important, therefore, that any aqueous solution used for cleansing or washing the eye be very close to the same osmotic pressure lor be in isotonicity with the tears which normally bathe the eye. The osmotic pressure of the tears is normally much higher than that of the blood, corresponding to about 1.4% solution of salt. Murine has been adjusted to this range of osmotic pressure.

Normally, the tears are slightly alkaline, having a pH of approximately 8.0. Marked changes from this hydrogen ion content may also cause irritation. Murine has therefore been buffered to this pH range.

Murine is indicated for regular use in industrial plants where strong light, dust, or metallic particles are prevalent. In cases of injury to the eyes, Murine is an effective first-aid preliminary to medical inspection and treatment.

MURINE CONTAINS

Potassium Bicarbonate,
Potassium Borate,
C.P. Boric Acid,
Berberine Hydrochloride,
Glycerin,
Hydrastin Hydrochloride,
Sterilized Water,
'Merthiolate' (Sodium Ethyl Mercuri Thiosalicylate, Lilly) .001%.

THE MURINE COMPANY, INC.

CHICAGO, U. S. A.

to maintain a healthy community, will have healthier and more reliable plant employees.

—From an account of the proceedings of the Ohio Ceramic Industries Association meeting, October 22-23, in *Ceramics Industry*, November, 1943.

Chest X-Rays

TEXTILES, INC., Louisville, is the first, and so far the only, industrial plant in the Louisville area to file application with the State Bureau of Industrial Hygiene for mass chest x-rays of all of its 700 workers, according to MAJOR W. E. DOYLE, director of the state bureau. The new company requirement of a chest x-ray as part of its pre-employment physical examination will institute another progressive innovation for this area. The service will be rendered free of charge, and the work will be done by the new photofluoroscopic method. This should prove beneficial to the company in selecting its future workers, and should aid the health of workers now employed by disclosing tubercular and other diseases requiring curative treatment and by assuring other workers of their not having to work with those who might communicate such diseases.

—*Textile World*, November, 1943.

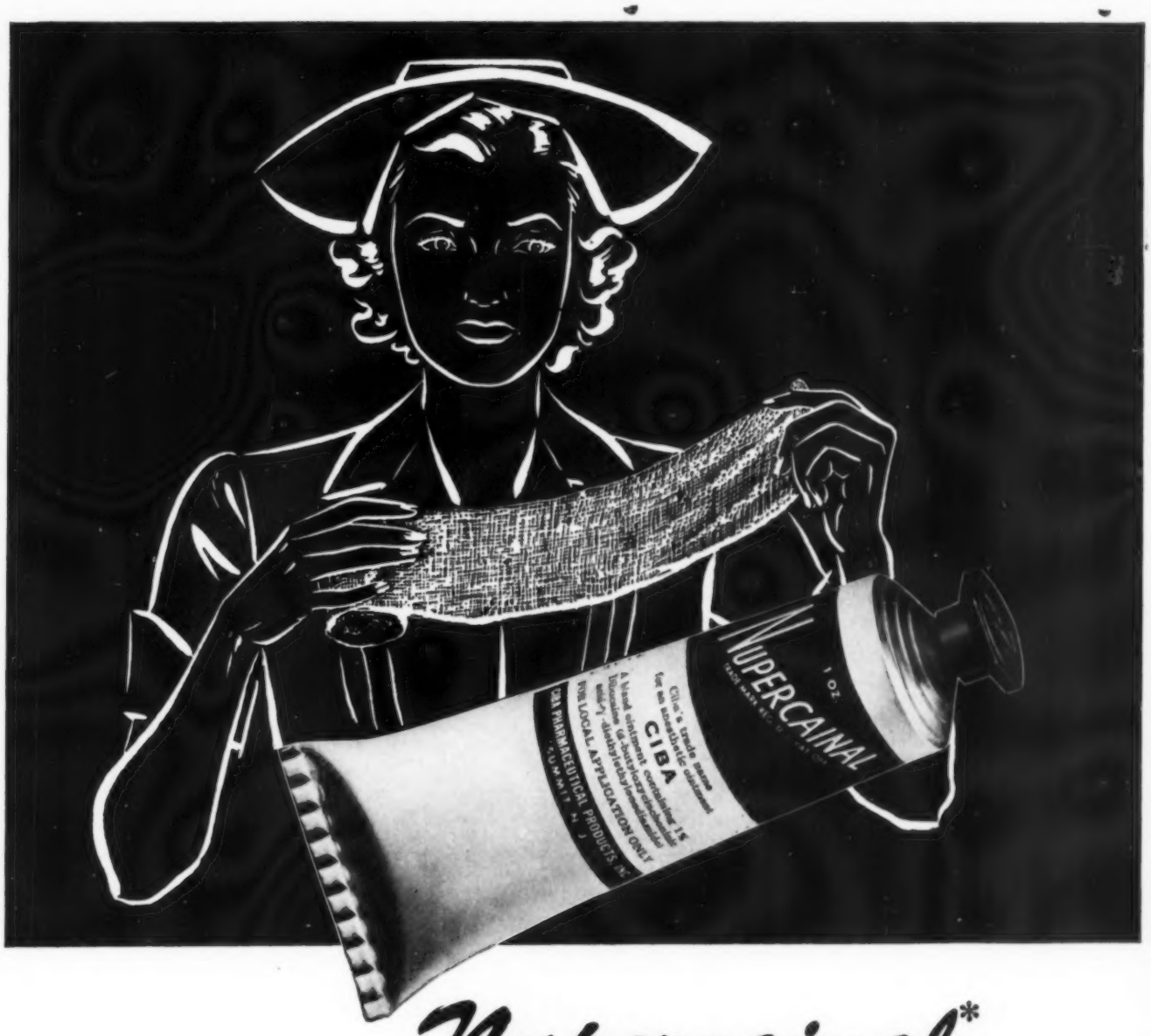
New England Seminar

DR. LEROY U. GARDNER, formerly of Boston City Hospital and now director of the Trudeau Foundation and Saranac Laboratory for the Study of Tuberculosis at Saranac, New York, speaking at a seminar on problems of industrial medicine conducted by the New England division of the American Mutual Liability Insurance Company at the Copley Plaza Hotel, said that "inhalation of fine aluminum dust will prevent and check silicosis." He underscored the fact that the aluminum dust must reach the same cells reached by the quartz dust which causes the deterioration of lungs and membranes. He told of gratifying experiments in his own laboratory, and described the enthusiastic responses of miners in Pennsylvania, among whom the powder has been tried. DR. WILLIAM A. BISHOP, associate physician at the Massachusetts General Hospital, told the seminar of 100 leaders in the field of industrial medicine that it is now possible to employ diabetics in war industries, with certain safeguards, particularly available within large organizations. "Diabetics, however, must be excluded from all hazardous jobs and elevated positions," he said. He made it plain that he was referring to controlled diabetes under regular treatments, because, he warned, the uncontrolled diabetic is a menace to himself and others. He said one in every 25 population is a potential diabetic. DR. BISHOP asserted that wounds may make existing diabetics worse temporarily because of interference with the routine of treatment but added that a wound cannot cause diabetes unless three-quarters to nine-tenths of the pancreas is destroyed.

—SARA WHITE, in *Boston Traveler*, October 22.

Laws and Amendments

ARIZONA has enacted an occupational disease disability law effective July 1, 1943. This act provides compensation for 35 scheduled diseases, including asbestosis and silicosis. The maximum benefit under the law is $5,000 and provision is made for a sliding scale of benefits for claims of silicosis and asbestosis. . . . OREGON has enacted an occupational disease compensation law effective July 1, 1943. It provides compensation for all occupational diseases, which are defined in the act to mean: "Any disease or infection which is peculiar to the industrial process, trade or occupation in each instance and which arises out of and in the scope of employment, and to which an employee is not regularly subjected or exposed other than during a period of regular employment therein." . . . CALIFORNIA has amended the Workmen's Compensation law as follows: "In the case of a member of a police department of a city or municipality, or a member of the State Highway Patrol, when any such member is employed under civil service upon a regular, full-time salary, the term 'injury' as used in this division includes heart trouble and pneumonia which develops or manifests itself during a period while such member is in the service of the department, or the State Highway Patrol, as the case may be." . . . IDAHO has amended its occupational disease compensation act to provide for the reference by the Industrial Accident Board to a medical panel for the determination of any controverted



*Nupercainal**

When discomfort from minor burns or abrasions keeps your patients from work or restful sleep, use ***NUPERCAINAL.*** This effective anesthetic ointment provides quick relief from pain in the treatment of many everyday accidents. It is also of value in the control of pruritis of the skin and mucous membrane, it provides lasting symptomatic relief of dry eczema, chapped and roughened skin.

NUPERCAINAL does not contain cocaine or any other narcotic drug. It has a prompt and prolonged anesthetic action.

One-ounce tubes • One-pound jars

*Trade Mark Reg. U. S. Pat. Off. Word "Nupercainal" identifies the product as containing "Nupercaine" (alpha-butyloxycinchoninic acid-gamma-diethylethylenediamide) in lanolin and petrolatum, an ointment of Ciba's manufacture.

CIBA *Pharmaceutical Products, Inc.*

SUMMIT, NEW JERSEY

Rx DESITIN OINTMENT

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medical question. The act further provides that no award shall be made in any case until the medical panel shall have duly investigated the cases and made its report with respect to all medical question at issue. . . . MARYLAND amended that part of the occupational disease act relating to enforcement by the State Department of Health and the Commissioner of Health of Baltimore City of provisions for the control and prevention of occupational diseases, making failure or neglect upon the part of an employer to comply with any rule or regulation promulgated by said Departments of Health a misdemeanor, and upon conviction imposing the fine of $100 per day for the period of time that the violation continues. . . . MASSACHUSETTS has amended its Compensation Act to provide compensation for frostbite, sunstroke and heat exhaustion. Another important amendment to the Massachusetts Act grants an employer the privilege of self insurance under the act. . . . MICHIGAN has completely revised the Workmen's Compensation Law and the provisions applicable to occupational disease have been substantially changed. The maximum compensation for silicosis or other dust diseases is increased from $3,000 to $4,000 and compensation for partial disability from these diseases is denied. . . . MINNESOTA'S Workmen's Compensation Law has been amended to delete the schedule of compensable diseases and to define compensable occupational diseases. . . . NEBRASKA'S Workmen's Compensation Law was amended to include compensation for occupational diseases which is defined.

—From the report of the Legal Committee presented by T. C. WATERS, at the Eighth Annual Meeting of the Industrial Hygiene Foundation, Pittsburgh, November 11, 1943.

WESTERN ASSOCIATION

THE following is from a general letter sent out by DR. RUTHERFORD T. JOHNSTONE, Secretary of the WESTERN ASSOCIATION OF INDUSTRIAL PHYSICIANS AND SURGEONS: "Nearly six months have elapsed since the WESTERN ASSOCIATION OF INDUSTRIAL PHYSICIANS AND SURGEONS had its convention in Los Angeles. It was the Secretary's intention to follow up that convention with a letter reviewing the highlights for those unfortunate enough not to have been present, but an overcrowded schedule has interfered. Yet there are certain echoes from the convention that all should know about. Since we met just prior to the State Medical Convention, many of that body took in our meetings. Considerable interest was aroused and many questions were asked; these and their answers seem to crystallize the object of our organization. I have picked out the ones most frequently asked. *Question:* How old is the WESTERN ASSOCIATION OF INDUSTRIAL PHYSICIANS AND SURGEONS? What is its history? *Answer:* Even many of our members are not cognizant of this history, so it should prove interesting and stimulating. The parent body, the AMERICAN ASSOCIATION OF INDUSTRIAL PHYSICIANS AND SURGEONS, was formed 28 years ago, holding its first meeting in Detroit, in 1915. Since then a number of component societies have been formed, of which we are one of the youngest, yet we are already third in size. The idea of a Western Association was considered by several west coast physicians and urged by the parent body. DR. CHRISTOPHER LEGGO, now in government service at Columbus, Ohio, did the early missionary work, gathering about him DR. WALKER, now president of the organization, DR. LEGGE, a past-president, DR. MCCULLOUGH, our treasurer, JOHN RUSSELL, now dead, and one or two others. Men in the San Francisco and Los Angeles areas were contacted. DR. KRESS and the late DR. DUKES were of great help in the north, while in the southern part of the state PHIL STEPHENS and JOHN OSBURN were invaluable. Sticking to the young organization was ELIZABETH CAFFREY, a nurse at the California and Hawaiian Sugar Refining Corporation, who took over the job of Executive Secretary. She is still doing a swell job—without pay. The first meeting was at Del Monte—a Sunday afternoon meeting attended by about 40 doctors, but it was a good beginning. The next year we met again at Del Monte, morning and afternoon, with a bigger attendance. Last spring was our third convention, two days of afternoon and evening meetings with an average attendance at each meeting of 200. Many of our speakers were men of national reputation, who came

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great distances to address us. That, without stopping to give full credit to those pioneers who deserve it, is a concise history of our beginning. *Question:* What is the purpose of this organization? *Answer:* Primarily to promote an educational program regarding the various phases of industrial medicine; to further this education by holding an annual convention where matters pertaining to industrial medicine can be discussed; to afford access to INDUSTRIAL MEDICINE, the journal devoted to this subject. As proof of this educational theme, in its second year the Western Association initiated and planned a series of five industrial Institutes which were held throughout this state. *Question:* Has this organization any political aspirations? Will it eventually usurp the functions of the Section on Industrial Medicine and Surgery of the State Medical Society? (This question was asked frequently). *Answer:* No; we are only an allied body in medicine the same as any other group, such as the Society of Dermatologists or Pathologists. The relationship of our body to the State Medical Society has been a healthy, frictionless one and will be so in other states as we enlarge in the various western states. *Question:* What relationship has the Western Association of Industrial Physicians and Surgeons to the U. S. Public Health Service? (This was also a frequently asked question.) *Answer:* None. The U. S. Public Health Service has a broad function, of which industrial health is only one phase. It has performed a valuable service in promoting industrial health and in supplying much information regarding the toxicity of industrial materials. We acknowledge this, just as we recognize the part the U. S. Public Health Service has played in the fight against tuberculosis, venereal disease, and the like. But as a body they have no authoritative voice in our organization. As individual physicians, the U. S. Public Health office is a welcome member, but there is no intention that the Western Association shall lose its identity in the U. S. Public Health Service or any group. From the aforementioned questions it can be seen that the growth of the Western Association has stimulated curiosity. It should also be obvious that an organization dealing with the problem of health arising

—*Continued on page 876*

TEN YEARS AGO

NATHAN SMITH DAVIS, M.D., F.A.C.P., in "Cardiovascular Diseases in Industry; Chapter IV—Arteriosclerosis and Hypertension," in INDUSTRIAL MEDICINE, December, 1933: "The industrial physician who makes periodic examinations of employees is in a position to greatly assist in the solution of these problems which will be solved not by the consultants and laboratory investigators but by the family physicians and those who are able to observe the onset and course of these diseases, to learn their earliest subjective and objective symptoms. Certain of the larger industries might even find it worth while to cooperate with the insurance companies in statistical studies and to arrange for the thorough examination of the individual employees when the first evidence of physiological or anatomical changes in the vascular system is found as a result of routine periodic examinations at the time when the diagnosis might be only potential hypertensive or arteriosclerotic disease. Arteriosclerotic and hypertensive disease is of particular importance to the physician in industry as sudden changes often occur spontaneously, changes such as cerebral hemorrhage or coronary thrombosis, that may endanger not only the individual but also other employees or patrons, as such an individual is more apt to cause accidents or to sustain injuries. An added difficulty is that these changes may occur in those who appear to be in good health, who have had no previous subjective symptoms, even though the disease may have been present for years. With our present insufficient knowledge of these diseases, it has become necessary to forbid the employment or continuing in employment in positions such that sudden disability on the part of an employee might endanger the lives of others, of those who are known to have well-established arteriosclerotic or hypertensive diseases."

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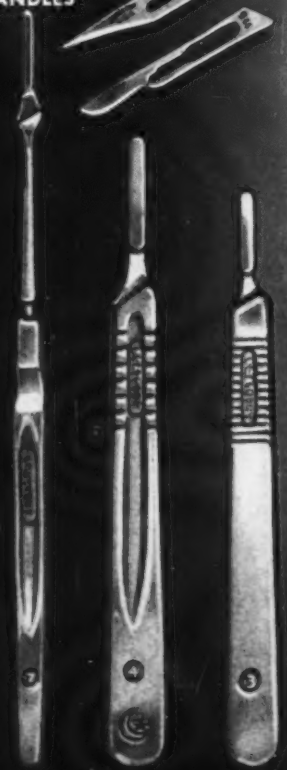

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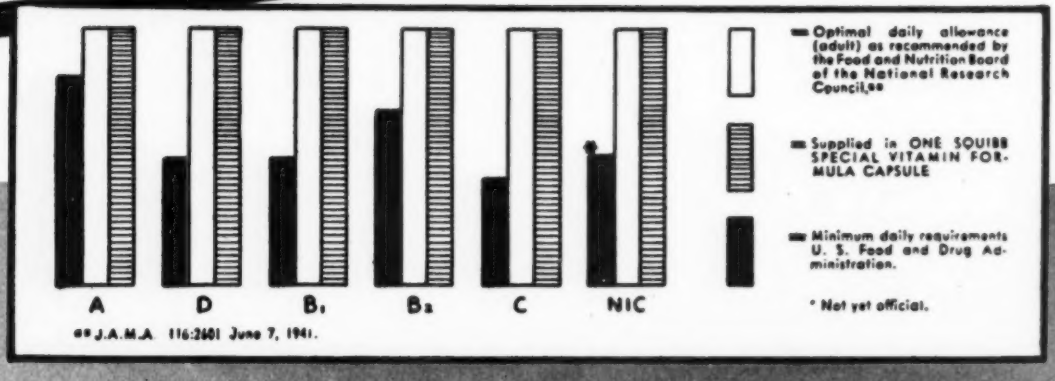
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(1) Spies, T. D.: *J. A. M. A.* 122:911, July 31, 1943.
(2) Jolliffe, N., and Smith, James J.: *M. Clin. North America* 27:587, March 1943.

For further information write the Professional Service Department, E. R. Squibb & Sons, 745 Fifth Avenue, New York 22, N. Y.

This magazine is published to promote sound thought upon and concerning industrial medicine and traumatic surgery. To that end it will contain articles, news items, reports, digests, and other presentations, together with editors' comments. The editorial policy is to encourage frank discussion. On this basis contributions are invited.

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The Journal of Industrial Health, Occupational Diseases and Traumatic Surgery

With which are consolidated "The Industrial Doctor" and "International Journal of Medicine and Surgery."

The Science, the Law and the Economics of Industrial Health

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Asthma

—Prevention in Industry—

IRVING GRAY, M.D., F.A.C.P.,
and
MURRAY M. ALBERT, M.D.,
Brooklyn, New York

BRONCHIAL asthma is an hereditary disease which occurs only in predisposed individuals. These potentially sensitive individuals may become specifically sensitized to various protein or non-protein substances with which they may come in contact in the course of their occupation. The period of exposure required before sensitization takes place may vary from a few days to several years, and differs with the individual. Occupational asthma is widespread and occurs most frequently among bakers,[1] furriers,[2] metal workers, cosmeticians, pharmacists, chemists, laboratory workers, refrigerator servicemen, upholsterers, hat makers, etc.[3]

Frequently, asthma is preceded by certain premonitory symptoms, such as nasal congestion, rhinorrhea, excessive sneezing, a dry irritating cough, or slight shortness of breath.[4] In this so-called "pre-asthmatic" state, prophylactic measures may serve to prevent the development of true bronchial asthma. Once the asthmatic state is present, secondary infection and other so-called intrinsic factors, etc., may serve to prolong the symptoms long after the patient has been removed from the contact which initiated the symptoms. The various procedures instituted by the advances in safety engineering and by increased medical knowledge in the prevention of occupational diseases may be of some value by decreasing the concentration of dust in the atmosphere. The use of a proper mask may be of some benefit. However, the value of these measures is often limited, since it is well recognized that the amount of allergenic substances to which the patient is exposed is not necessarily the deciding factor in precipitating an attack of asthma. Allergy, or hypersensitiveness, is inherent in the individual, and the response of the so-called shock tissue (mucous membrane of the nose or bronchi, skin, mucous membrane of the gastro-intestinal tract, etc.) may be elicited even when the allergen is present in slight amounts.

Pre-employment or pre-placement physical examination may fail to reveal any findings whatsoever which suggest the presence of allergic diseases. The personal and familial history of allergy is the most important factor in determining whether or not an individual should be employed in a dusty trade. Routine skin-testing, as a part of the pre-employment physical examination, would be time-consuming, expensive and impractical.

A past history of allergic disease is the most important single factor in presaging the occurrence of asthma as a result of occupational exposure. An individual who gives a history of having had eczema, urticaria, food intolerance, allergic rhinitis or hay fever is most likely to become sensitized when exposed to allergenic substances, such as furs, flour, drugs, etc. These individuals possess a hereditary predisposition to become sensitized and require a variable period of exposure to the allergen before clinical symptoms of hypersensitiveness are manifested. The time of exposure required varies with the type of allergen and the prominence of hereditary characteristics. There is no method by which it is possible to pre-determine either the period of exposure required or the concentration of the allergenic substances necessary to initiate asthmatic symptoms. It is good practice, therefore, to exclude individuals with a past or present history of allergic disease from engaging in those occupations where the incidence of asthma is known to be high (such as in the baking or fur industries) or where the concentration of dust is great.

Case Reports—"Occupational" Asthma

CASE No. 1—(S.M.)—*Asthma Due to Feathers.* A white male, aged 52 years, was first seen November 9, 1940. The chief complaint was severe asthma for the past five to six years. The patient had been working for the past 16 years in a feather plant; the past 12 years for his present employer. His duties consist of sterilizing and sorting all kinds of feathers. About six or seven years ago, he began to cough while at work. The coughing usually stopped when he left his place of business. For the past five years, he has been wheezing and is extremely short of breath, especially while at work. Asthmatic attacks occur every month or so, but lately they have become very frequent. Recently, he remained away from his business for six months and was perfectly well. The family history was negative for allergy.

The essential findings were marked emphysema and hyperresonance of the chest. Sibilant and sonorous

rales were heard after exercise. Moist rales were present at both bases. The mucous membrane of the nose was pale and edematous. Nasal smears and blood smears showed an abnormal amount of eosinophiles. The patient was skin-tested by the intracutaneous technic and showed postive reactions to cottonseed, kapok, horse hair, chicken feathers, rabbit hair, dog epithelium, cat epithelium, goose and duck feathers, goat, wool and dust. He was treated by hyposensitization therapy but this was not effectual, and he had to leave his occupation.

Clinical Comment: This case demonstrates the occurrence of sensitivity to an occupational contact after several years of exposure to a potent allergen. The first symptoms were sneezing, nasal congestion, and cough. These were followed within a year or two by frank asthma. In all probability the onset of asthma could have been prevented had the patient been removed from the occupational environment at the time of the first occurrence of the nasal symptoms.

CASE No. 2—(H.B.)—*Asthma Due to Furs and Fur Dyes.* A white male, aged 39, was first seen on April 8, 1940. He had been working as a fur-dye chemist, handling all types of dyes, for the past year. About six years ago he was also engaged in the same occupation for a short time. Approximately three months after he had been working for the present employer, he noticed that he would have frequent sneezing spells when he was exposed to dyed or dressed furs. Shortly thereafter he developed wheezing and difficulty in breathing. This occurred only while he was at work. These attacks gradually increased in frequency and began to occur while he was at home during the evening and early morning hours. The patient's brother is a furrier and also has asthma.

Physical examination was essentially negative at the time of the initial examination. Nasal and blood smears showed an abnormal amount of eosinophiles. Subsequently, on re-examination, sibilant and sonorous rales were heard throughout the chest. The patient was completely skin-tested with foods, inhalants, and extracts made from furs supplied by him. Positive reactions were obtained with rabbit skin, kid skin, lamb's wool, lamb skin, goat, feathers, dust, and floor sweepings. Hyposensitization was instituted with a mixed inhalant extract and the response was excellent. The patient continued at his occupation.

Clinical Comment: This case illustrates the occurrence of pre-asthmatic symptoms prior to the onset of the first true asthmatic paroxysm. The family history was positive, the patient's brother having developed asthmatic symptoms while engaged in the fur industry also. An abnormal amount of eosinophiles was present in the blood and nasal secretions. The patient was also clinically sensitive to dyes, although testing with these materials was not attempted because of the false reactions and attendant dangers involved. A careful history taken at the time of commencement of employment in the fur industry, would have revealed the presence of a positive family history of allergy and the subject would have been regarded as a poor risk, especially since his brother was a fur asthmatic. The unusually successful results obtained with hyposensitization therapy in this case are the exception, rather than the rule.

CASE No. 3—(B.M.)—*Asthma Due to Flour* (Baker's Asthma). A white male, aged 39 years, was first seen on September 26, 1942. The chief complaint was sneezing, nasal congestion, coughing, wheezing, and difficulty in breathing for about three years. The patient stated that he had been employed as a baker for the past 11 years. For about nine years, he worked in the mixing room, handling flour, without ill effects. In December, 1939, he became short of breath, sneezed excessively, coughed and wheezed. His nose was continually blocked. Soon afterwards, he began to have severe asthmatic attacks, especially while at work. He remained away from work for two months and was fairly comfortable, but when he returned he began to have severe asthmatic attacks again. He was then given a position in the oven room of the bakery and felt much improved while working there. The patient stated that his brother has asthma and "got it the same way."

The essential physical findings were a prolongation of the expiratory phase and sibilant, sonorous rales throughout the chest. A blood eosinophilia of 3% was present and some eosinophiles were found in the sputum. Intracutaneous tests were performed and positive reactions were obtained with wheat, rye, oats, rice and several flours furnished by the patient and obtained at the bakery in which he was employed.

Clinical Comment: Mild nasal symptoms anteceded the first attack of asthma in this patient. The family history was positive and the fact that the patient's brother has a similar type of asthma is significant. The onset of asthma could probably have been avoided in this case. Many years elapsed before the first symptoms were noted. An atopic patient is a poor risk as a baker.

CASE NO. 4—(C.S.)—*Asthma Due to the Inhalation of Cadmium Fumes* (Plater's Asthma). A white male, 58 years of age, was first seen March 5, 1941. The chief complaint was wheezing and frequent attacks of asthma since October, 1940. Attacks have been increasing in severity. The patient stated that he had been working at plating nickel, brass, copper, zinc, and tin for many years, and had never experienced any ill-effects. In June, 1940, he changed his place of employment and began to work as a foreman plater. Until October, 1940, he worked with nickel, copper and brass. In October, he first began to work at cadmium plating. After two or three weeks of dipping metal into cadmium solution, he began to cough excessively. He noticed that the fumes given off from the cadmium tank aggravated his cough. Some of his fellow-workers also were unable to tolerate the fumes. The cough continued until March, 1941, when he noticed that he was extremely short of breath. He became progressively worse and was hospitalized in status asthmaticus. The family history and personal history were negative for allergy.

The essential physical findings were the presence of mucopus in both nasal fossae; the chest was emphysematous, and sibilant and sonorous rales were heard throughout. The blood eosinophilia varied between 3% and 14%. Eosinophiles were present in the sputum and nasal secretions. Intracutaneous tests with most of the common foods and inhalants were negative.

Clinical Comment: This patient probably sustained irritation to the lung tissue as a result of the inhalation of cadmium fumes. Following this insult, he evidently developed a superimposed infection which resulted in the production of infectious asthma. It is interesting to note that this patient first began to have an irritating cough after three weeks' exposure to cadmium fumes. However, he continued working and within six months he experienced his first asthmatic attack. As a result of this infectious type of asthma, the symptoms have persisted with resulting bronchiestasis.

CASE No. 5—(D. F.)—*Asthma Dermatitis and Allergic Rhinitis Due to Furs.* A white male, 30 years of age, furrier by occupation, was first seen

November 29, 1940. The chief complaints were inflammation of the face and hands for the past six months; severe nasal congestion, rhinorrhea, and coughing for the same length of time; and wheezing for the past month. These symptoms began almost immediately after he engaged as an operator on dyed skunk fur.

The family history is strongly positive for allergy. On several occasions during the past few months, the symptoms and skin lesions cleared up while the patient was away from business.

Physical examination revealed a scaly dermatitis over the eyelids, face and hands. Examination of the nose showed edema and paleness of the mucous membrane of both inferior turbinates. The patient's chest was essentially negative at the time of initial examination. The patient was skin-tested by the intracutaneous technic and was found positive to sweepings from his place of business, goat hair, rabbit hair, feathers, dust, wool and skunk. Patch tests with furskin dye supplied by the patient were positive. The nasal smears and blood smears showed abnormal amounts of eosinophiles. Hyposensitization therapy was advised and protective measures, such as wearing of gloves, lubrication of face and hands, and wearing a mask were tried. The patient did fairly well under this regime.

Clinical Comment: The symptoms in this case began almost immediately after the patient started to work as a furrier. The allergic family history was strongly positive and, under these circumstances, this patient should never have been allowed to engage in such a hazardous occupation from the allergic point of view.

CASE No. 6—(C. S.)—*Asthma Due to Flour* (Baker's Asthma). A white male, 50 years old, was first seen in March, 1942. He had been having difficulty in breathing, wheezing, sneezing and rhinorrhea for the past one and a half years. He has been employed as a baker for the past 35 years. A few months prior to December, 1941, he began to cough and sneeze excessively. This continued and became progressively worse. On December 12, 1941, he developed extreme difficulty in breathing and could not work. At this time, he consulted a physician who informed him that he had asthma and treated him for this condition. His asthma continued in spite of the fact that he had ceased working. It was particularly severe at night. The family history and personal history were negative for allergy.

The essential physical findings were a few moist rales over both bases, and a pale and edematous nasal mucosa. A nasal smear showed an abnormal amount of eosinophiles. Eosinophiles were also present in the sputum. The blood eosinophilia was 2%. Skin testing was performed by the intracutaneous technic, and positive reactions were obtained with wheat, corn, rye, rice, barley, oats and bakery sweepings.

A diagnosis of bronchial asthma due to sensitivity to various flours was made. The patient was advised to change his job.

Clinical Comment: In this case, there was no family or personal history of allergy. However, the onset of the asthma was anteceded several months by nasal symptoms and coughing. A routine nasal smear at this time would have probably shown the presence of an abnormal amount of eosinophiles. It is interesting to note that this patient was employed as a baker for more than 30 years before he manifested any signs of allergy to flour.

CASE No. 7—(G. D.)—*Asthma Due to Furs*. A white male, aged 31 years, was first seen on May 9, 1942. The chief complaint was choking and difficulty in breathing, especially at night. The symptoms had been present about three months. The patient stated that for 18 months he had been working as a floor boy, dyeing and blending furs. He was in contact with muskrat furs and various dye chemicals. After working for 14 to 15 months, he noticed that he would get "choking feelings" and couldn't catch his breath. The symptoms became progressively worse during the next two or three months and the patient was hospitalized in status asthmaticus for several days. He resumed his occupation in the same industry, but with another employer. However, he could not continue, since he wheezed and was continually short of breath, especially at night. The personal and family histories were negative for allergy.

Physical examination revealed a prolongation of the expiration phase and wheezing throughout the entire chest. A nasal smear showed the presence of eosinophiles in the secretions. A blood eosinophilia of 8% was present. Skin testing by the intracutaneous technic with many furs and inhalants was essentially negative and it was presumed that the patient's asthma was probably due to the inhalation of dye chemicals. Symptoms have been present for 12 months, despite the fact that the patient has not engaged in his occupation.

Clinical Comment: This case clearly illustrates the persistence of asthma long after the specific etiologic factor has been removed from the patient's environment. The continued daily contact with dye chemicals, three months after the onset of initial symptoms, produced a severe asthma which has been irreversible.

CASE No. 8—(E. de S.)—*Asthma Due to Insecticide*. A white male, aged 31 years, was first seen in March, 1940. The chief complaints were coughing, wheezing, and shortness of breath for the past six weeks. The patient stated that, for 10 months, he had been working, milling and grinding crude drugs such as papine, derris root and pyrethrum, which are commonly used as insecticides. He always wore a mask. In February, 1940, he had had a severe coughing spell while at work. On March 11, 1940, he had another severe coughing spell while at work and became short of breath. This lasted for several hours and he consulted his family physician who gave him an "injection of adrenalin" which relieved the attack of asthma. There was no personal or familial history of allergy.

Physical examination was essentially negative. A blood eosinophilia of 22% was present, and there were eosinophiles in the sputum. Skin testing showed marked reaction to pyrethrum, and a patch test with the same substance was positive. The patient was eventually advised to change his occupation. He has been employed in the leather industry for several years and has never had an asthmatic attack since then.

Clinical Comment: This case strikingly illustrates the results following a change of occupation in an individual who has become sensitized to a potent allergen as a result of continued contact.

Discussion

IN EACH of the cases cited above, there were definite pre-asthmatic symptoms, such as nasal congestion, sneezing, rhinorrhea, cough or shortness of breath. These should be considered as premonitory symptoms of asthma. The prevention of the asthmatic attack requires the immediate removal of the individual from his environmental contact if examination reveals symptoms of hypersensitiveness. The criteria for a diagnosis of the pre-asthmatic state may be divided into (1) clinical evidence and (2) laboratory data.

The clinical symptoms have been described above. On physical examination, there may or may not be rhinorrhea, edema of the nasal mucosa, and suffusion of the eyes. Sibilant and sonorous rales, prolongation

of the expiratory phase, or audible wheezing may or may not be present.

The laboratory data suggestive of hypersensitiveness are:

1. Eosinophiles present in the nasal smear.
2. Eosinophiles present in the sputum.
3. An abnormal blood eosinophilia.
4. Positive skin tests.
5. Environmental tests.

Dyes and chemicals cannot be satisfactorily employed in skin-testing because of the attendant dangers and the non-specific irritating qualities of the testing material. Autogenous bakery sweepings or autogenous fur dusts may be employed. A positive skin reaction is not conclusive evidence that the substance is the causative factor, nor does a negative skin reaction rule out the possibility that the material tested with, is not the causative agent.

Infection is recognized as the most common cause of asthma. Intrinsic factors, non-industrial in origin, may be responsible for the asthmatic attack even though the individual is employed in a dusty trade. Usually, the removal of an individual from his occupational environment will terminate the asthma. In some instances of occupational asthma, removal from contact with the offending allergen may fail to terminate the attack by reason of the fact that superimposed infection is present.

The removal of all individuals who have pre-asthmatic symptoms from their occupational environment has already been stressed. All employees should be advised to report the onset of symptoms such as running nose, sneezing, occasional cough, etc. In most instances, removal from the occupational contact is sufficient to terminate the asthma. In some cases, however, specific therapy may be successful and the subject can continue in his occupation. Asthma may recur months after the initial onset of the disease, at a time when there has been no further contact with the original, offending agent. The relationship between the initial and subsequent attacks is a moot question. It is only in the prevention of asthma in industry by the criteria established, that these contentious problems may be prevented from arising.

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Sewer Gas

—Hazards in Sewage Plants—

C. SCOTT McKINLEY, M.D.,
Director, Bureau of Industrial Hygiene, State Health Department, West Virginia, Charleston

SEWER GAS is deadly. One man was recently killed in a sewage disposal plant when he opened a pipeline and allowed a pumping pit to partially fill with sewage sludge. Two more men died in attempting to remove him. Three other men were overcome but survived. The three men would be alive today if the first man had left the pit as soon as the mistake was made and stayed out. Such a departure from the pit would have been possible instead of a permanent departure from this world.

In the hope of preventing a recurrence of this type of accident, a brief summary of the hazards of sewer gas in sewage plants has been drawn up with recommendations for the control of the hazards.

Sewer gas is found in sewers, cesspools, privy vaults, sewage disposal or treatment plants, and generally wherever there is putrifying organic material. The hazards associated with this gas are: (1) poisonous gases that approach the toxicity of hydrogen cyanide, (2) inflammable gases that may cause explosion, and (3) deficiency of oxygen.

Of the poisonous gases, hydrogen sulfide is the most important. Its toxicity is almost as great as the cyanides. In concentrations of only 0.1% it will cause immediate unconsciousness (only one or two breaths), and unless the person is immediately removed from the exposure and given artificial respiration the outcome will be death. The concentrations of hydrogen sulfide in sewer gases vary from 0% to approximately 3%. The potential lethal qualities are readily apparent. They are even more apparent when it is realized that hydrogen sulfide has the smell of rotten eggs and is readily detectable, but one cannot correlate the intensity of the odor with the actual amount present and in a few minutes the sense of smell for the gas is lost. Once adjusted to the odor there may be no unpleasantness associated with the gas until suddenly the individual feels weak, is unable to escape, and falls unconscious.

The explosive gases are mostly methane, but other explosive materials such as benzol, gasoline, and illuminating gas may leak into sewers. Protection from explosion is essentially the same as for any gaseous explosive mixture. It must be remembered that whenever there is a leak of sewage material into a confined space the explosion hazard is present and no open flame should ever be carried into such a space.

Oxygen deficiency is to be expected where sewer gas has accumulated because oxygen is not one of the gases formed and the other gases, being heavy, displace it. The ill effects of breathing in an oxygen-deficient atmosphere are insidious. The individual, although weak and "light headed," may feel exilarated and silly rather than feel a desire for "fresh air."

Many small sewage disposal plants have an extreme hazard that is often forgotten, overlooked, or not sufficiently emphasized. Such plants generally have a pumping pit or pumping room below ground level. If sewage leaks into this pit it may become a death trap because of the inexperience of the men dealing with the problem. The only sure method of preventing a fatality may be briefly summarized as follows:

1. Assume any hydrogen sulfide odor (rotten eggs) indicates a lethal amount and get out.
2. Request help of those experienced with the hazard, namely, safety director, industrial physician, industrial hygienist.
3. No gas mask will protect against oxygen deficiency; either oxygen or air supplied breathing apparatus must be used in entering such a space.
4. In entering the area with proper protection have at least two other individuals present to give assistance if necessary.
5. Have no open flame near the area or with you.
6. Wear a safety belt and line.
7. Don't think you can hold your breath and enter the area. This has cost many unnecessary lives.
8. Hydrogen sulfide may persist for days or longer unless removed. If there is a drain in the floor it may be carried off over a period of time. However, the gases should be expelled by forced ventilation.

General precautions in relation to pumping pits of sewage disposal plants:

1. Thoroughly emphasize to those ever called upon to enter or work in the pit the hazards that may be present and the minimal warnings given by such a lethal atmosphere.
2. When any pipe line through the pumping pit is to be opened have at least two persons present.

3. Have safety signs over important valves and connections.

4. On the ground floor above the pumping pit near the door place a cabinet with a glass front containing: (a) self-contained oxygen breathing apparatus, and (b) safety belt and line. Check and record contents of cabinet at least once a month.

The Cardiac under Forty-Five

—His Placement in Industry—

WALTER S. PRIEST, M.D.,
Chicago

BEFORE the era of industrial medicine as it exists today with pre-employment physical examinations, and before the advent of employers liability acts and workmen's compensation laws, whether John Jones, compensated cardiac, should or could work was decided by John's personal physician. And even today, every internist and general practitioner has cardiac patients working steadily at jobs within their individual capacities in offices and small plants where pre-employment physical examinations are not required.

However, in the large industrial plant and in the large office employing full or part time medical personnel, the decision no longer rests with the personal physician but with the plant physician. He in turn has been influenced by the attitude of the personnel manager, who naturally wishes to avoid in so far as he can, anything which might increase the company's liability.

This is in no sense derogatory of the excellent and conscientious work of the industrial physicians, who today represent some of the best brains in medicine. It merely emphasizes that the problem has become more sociological than medical in so far as large industry is concerned.

With this thought in mind we may profitably consider what has been done and what can be done to give the compensated cardiac his rightful chance in industry. It is well to emphasize the word compensated. By this is meant the cardiac who has demonstrated his ability to maintain a level of activity comparable, at least, to that of a sedentary occupation.

I will confine my discussion to the forms of heart disease most commonly encountered under age 45, namely congenital lesions and rheumatic valvular deformities.

Since rheumatic fever is chiefly a disease of childhand with its peak incidence around age eight and since 50% or more of those afflicted do not survive long enough to reach employable age, it follows that most of those who do survive either have minor degrees of valvular deformity which never put a significant burden on the heart or are individuals whose hearts have been able to compensate for whatever burden there is. There are also those who go through a period of decompensation but recover sufficiently to engage in sedentary work for several years.

A good example of the first group is a man now nearly 40 who had his first attack of rheumatic fever at age 10 which left him with a mild mitral deformity. He finished college without a break in compensation. He played a stellar role on both his high-school and Big Ten college football teams, certainly concrete proof that the valvular deformity was not burdening his heart much. Just as he finished college he had a second attack of acute rheumatic fever. His convalescence was prolonged and carefully controlled. About a year later he was permitted to go to work as a salesman. His level of activity has remained at this point for 16 years, he has married, raised a family, takes care of his suburban home and has not at any time had the slightest indication of cardiac incompetence. Yet he has a mitral systolic murmur which would have disqualified him for employment in most industries, despite the fact that the evidence shows that he would have been safely employable in many industrial jobs.

The other extreme of potentially employables is illustrated by a man in his twenties who managed to survive past age 18 in spite of double mitral and aortic lesions. He had a period of acute congestive failure four years ago. After about eight months it seemed that his compensation was sufficiently restored to permit employment in a strictly sedentary job. At first he found it impossible to "get by" any company physician. Early in 1941, owing to the tremendous acceleration of industry, he was able to get a job as an in-door watchman in a defense plant. When last heard from he was on the job and still compensated.

The part the attending physician plays is indicated by these two examples. He must have sufficient knowledge of heart disease to enable him to manage acute rheumatic fever and acute decompensation. Then, by careful and frequent follow-up observations, he must evaluate the work level of the patient. He must spend considerable time teaching the patient how to live within the limits of his cardiac reserve and, lastly, he must be prepared to cooperate with the industrial physician, if so requested, in fitting the job to the patient and seeing to it that the patient does not tear down his cardiac reserve by unnecessary activity outside his job.

THE medical aspects of congenital heart lesions in relation to employability are basically the same as those of acquired valvular lesions. In those who survive to an employable age may be found degrees of cardiac embarrassment from slight to severe. What the patient can do is the important thing, not what the lesion is or how loud the murmurs.

Occasionally a persistently elevated blood pressure will be found in a young applicant. On the reasonable assumption that he is dealing with juvenile hypertensive disease with its bad prognosis the industrial physician will justifiably refuse employment. Some of these, however, will turn out to have coarctation of the aorta and as such will have many years of employable existence. At present I have two such patients under observation, one of whom has been successfully employed as a secretary for five years.

Turning to the sociological aspects of the problem we encounter apprehension and lack of understanding on the part of employers, a certain amount of failure on the part of the profession to conduct a proper educational program, inadequate cooperation among attending physicians, social agencies and plant physicians, and low education levels of prospective employees.

The association in the lay mind of sudden death, fainting spells and repeated absences from work with the term heart disease has caused many employers to be afraid to employ anyone with any kind of heart ailment. A rather amusing incident in this connection was told by Mrs. Frances Karlsteen, Employment Director of the Illinois Association for the Crippled. On approaching a certain employer regarding the hiring of one of her cardiacs his attitude was "anything but a heart case; he will be fainting all over the place and scaring people out of their wits." After some persuasion he reluctantly agreed to a trial. A few weeks later he phoned to say he would like a couple more just like the first one, who had turned out to be one of his best employees. Among other things, seemingly to

Presented at a joint meeting of the CHICAGO SOCIETY OF INDUSTRIAL MEDICINE AND SURGERY and the Chicago Heart Society, November 1, 1943.

his surprise, he learned that a cardiac does not have a scarlet letter branded on his forehead but looks and acts just like any other human being.

During the depression years, when labor was plentiful, industry could hardly be blamed for refusing to employ anyone with a cardiac impairment. With the labor shortage incident to the war, many compensated cardiacs have of necessity been employed in industry. The information which can be gained from this enforced "experiment" would be of immense value if, at the close of the war, someone would undertake to collect the data from all, or at least many, different sources. But even before the war the deliberate employment of cardiacs was undertaken on a small scale here in Chicago. Dr. C. E. Shannon, of Marshall Field & Company, in cooperation with the Chicago Heart Association, began to recommend for certain types of employment selected cardiacs considered capable of working by their attending physicians. These people were placed in a variety of positions, including clerical, stenographic, sales, elevator operating, to mention only a few.

About a year or so ago Dr. Shannon reported the results of this experiment, which were gratifyingly good. In a personal conversation last week he reiterated this experience and said that, as a group, these people were honest and attentive to their jobs and had no more lost time than the average for the non-handicapped. In nearly all of these people the cardiac impairment is of the rheumatic or congenital type.

Some idea of how the employment of cardiacs is working out in other fields was obtained from information furnished by Mrs. Karlsteen. Ten case reports picked at random were submitted. Six were males and four females. Ages ranged from 17 to 29, length of employment from one month to two years. Judging from the medical histories, I would class eight as having moderate to severe cardiac impairments and two as slight. In only one case was it apparent that the subject would be unable to continue working. The jobs included receptionist, mail order clerk, power machine operator, light parts assembly line operator, elevator operator, label paster, light factory work, lens driller. Some of the individual comments are so enlightening that I cannot refrain from quoting excerpts: "Mother states boy is happy for the first time in his life, is picking up weight, has a wonderful appetite and hasn't missed a day of work"—"The social worker said, although the patient's heart was very bad, it would be necessary for him to work in order to keep peace in the family, since he was one of many children and there was great need for whatever earnings he could bring in to the support of himself and his family"—"It is especially difficult to place this boy because he can neither read nor write. In other words, we had a mentally retarded applicant who ordinarily would fit into an unskilled heavy labor classification, who is barred from this field because of the very seriously impaired heart. We were able to get a position with an optical company where he is doing a simple routine repetitive job, drilling lenses. The employer reports that he is a very fine worker, has been steady and conscientious and is entirely satisfactory" —"We found the employer to be very cooperative with a real feeling of interest in this boy, and were pleased to hear that the boy himself had asked the employer to place him in line work, and this had already been done. The type of work he was doing was described and, in my opinion, would seem to be entirely within his ability to perform."

I would like to emphasize the last comment, for it indicates something we as physicians can and should do. As industrial physicians we should try to convince employers and personnel managers that the selected cardiac, carefully supervised by his attending physician or clinic and fitted to a job within his capacity by the plant physician, is a good employment risk. In our private capacity we can make use of opportunities to remove the fear of employing cardiacs from the minds of our employer patients and friends. It is well to remember that the Chicago Heart Association and the Illinois Association for the Crippled have much factual information on the subject which is worth the consideration of any employer. Also that these organizations can act as liaison officers in the solving of the employment problems of individual patients.

The boy who could neither read nor write is typical of a group for which it is very difficult to do anything. He goes into heavy manual labor early in life, and the heart disease is not known until compensation fails. When he recovers he must be educated to a sedentary type of work usually requiring some degree of finger dexterity, or he becomes a public charge. The opportunities for such education are limited. The Chicago Heart Association has facilities for training a few, but more facilities are needed, and it would seem that here private philanthropy or local or state governments have a field worth considering. Organized medicine, in cooperation with interested social agencies, could accomplish this. Such training schools could also be used as work shops for the cardiac or other handicapped individuals who cannot work a full eight-hour day and for whom there are naturally very few openings in industry.

THE legal aspect of the problem grows out of the wording of the workmen's compensation act which makes aggravation of a pre-existing impairment compensable and which prohibits an employee from entering into an agreement with an employer to waive liability in connection with such aggravation. Many if not all persons with known handicaps would be quite willing to enter into such agreements. To the credit of the cardiacs who have been employed the record so far is encouragingly free of attempts to capitalize on this aggravation clause. Whether this will continue as larger numbers of cardiacs are employed remains to be seen. If it does not, then industry will be forced in self defense to close its doors to cardiacs as well as other minor handicapped individuals. To a non-legal minded doctor this wording of the law seems to abrogate a constitutional right of the individual. At any rate it ought to be changed—Another job for organized medicine and social agencies. That such agreements between employee and employer have worked without harm to the employee is indicated by a recent report from Connecticut which in summary says "The employer wants it, labor does not seriously object to it, our commission approves of it, and our rehabilitation department finds that it helps considerably in placing handicapped people in jobs."

In summary, may I repeat that the placement of compensated cardiacs in industry is possible and feasible through the intelligent understanding and cooperative effort of the employer and industrial physician on one hand and the attending physician, social agency and patient on the other. I am informed by one personnel director that the attending physician "may be put on the spot," particularly in a small community, by his personal relations with the patient and his friends, and may recommend such patient for employment when it is not justified by the medical facts. Since the keystone of this cooperative enterprise is the industrial physician, it should be his place to accept or reject the recommendation of the attending physician. If he finds that he cannot accept he might, in collaboration with the attending physician, secure an impartial outside opinion.

A Practical Program for Human Rehabilitation

—A Job for Everyone, and Everyone in His Job—

HAROLD A. VONACHEN, M.D.,
Medical Director,
Caterpillar Tractor Co.,
Peoria, Illinois

THE return of the physically handicapped from military to civilian life presents a problem which will test American ingenuity equally as much as its economic and political problems. Unless a well organized program is prepared in advance, we will be faced with the returning disabled man being forced to wait for a job, with each day's delay increasing his resentment, his mental depression and his thought that he might be dependent upon charity.

About 18 months ago, "Caterpillar" realized that four to five thousand of its employees would return after the war with many of them suffering from physical handicaps. In facing this problem the company could draw upon their many years of experience in the rehabilitation of their own physically handicapped. This, plus a shortage of manpower, presented the possibility of unifying our programs for the civilian and military handicapped people. Steps were taken for its formation, with close cooperation between Medical, Personnel, Training and Safety Divisions.

It was first necessary to determine the jobs available for these individuals, and so a survey was made in which each supervisor listed the jobs in his department which could be performed by employees with the handicaps listed on the survey cards. With this information, the Personnel Division, with its knowledge of "job analysis" was ready to interview the individuals, and then present the applicant to the Medical Division for its approval of the specific job chosen. A personal interview followed, impressing upon the employee the necessity for care and safety in his work, and a note was placed upon his record card to the effect that no transfer could be made without the consent of the Medical Division.

JOB ANALYSIS

TOOL CRIB HELPER

Store supplies in proper bin
Issue tools, supplies and equipment
Record all tools and supplies issued
Deliver tools to machine operators
Miscellaneous messenger service

MINIMUM PHYSICAL REQUIREMENTS OF JOB

Sight	—One eye—normal, corrected		
Hearing	—One ear—normal, corrected		
Speech	—Able to talk	Walking	—Normal
Arms	—One—normal	Hands	—One—usable

Typical Job Analysis

Supervision and training now appear in the picture. Supervision was instructed in the proper handling of these people, and then the "Job Instructor Training" given job trainers. That supervision has given its complete approval, there can be no doubt, for almost daily they are asking for more handicapped employees. They are continuously finding new jobs, and several supervisors have learned the sign language in order that they might converse with their deaf mutes. Many of our employees with physical handicaps are attending special classes given by our training school in order that they may advance in their quest of independence.

There can be no doubt that this program has been successful at "Cat-

COMPANY		DEPARTMENT				DATE		
Member	Loss	Office Employees			Sales People	Factory Employees		
		Skilled	Semi-Sk.	Un-Sk.		Skilled	Semi-Sk.	Un-Sk.
Sight	Partial							
	Total							
Hearing	Partial							
	Total							
Legs	Partial							
	Total							
Feet	Partial							
	Total							
Hands	Partial							
	Total							
Arms	Partial							
	Total							
Heart Disease								
Back Condition								
Other organic disabilities								
Total No. of jobs that above people could do								

A blind man fixes safety glasses

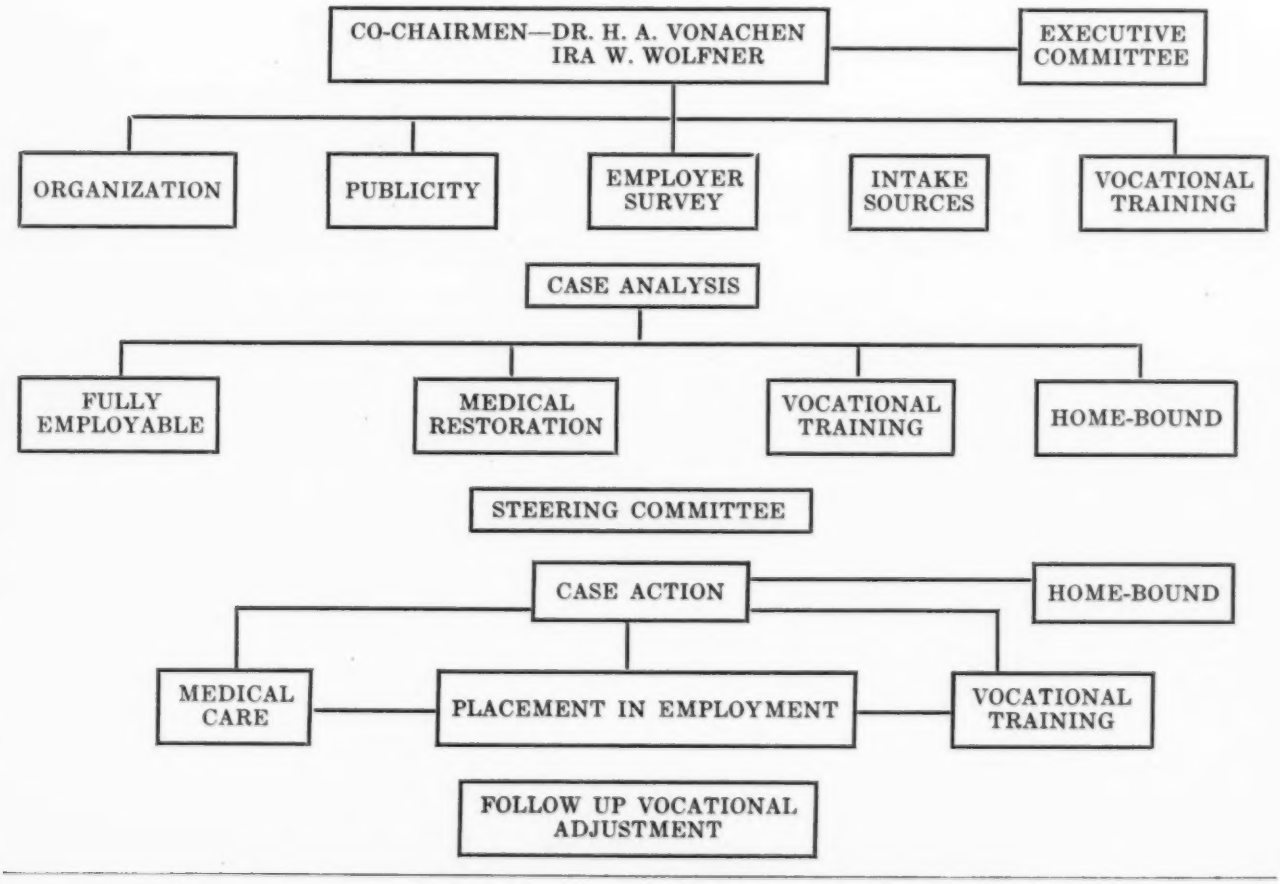
A foreman has learned the sign language

erpillar" for the vast majority of these people have a production, safety, and absentee record above normal. They are paid the same rate as normal individuals; they are shown no special favors, and they are in no way considered as accepting charity. They will be given the same consideration as any other employee in being retained on the job in the days following the war.

It might be well to consider here the classification of the handicapped. Some employers list on their payroll many thousands of physically handicapped people, but they include in the group: employees with hernias, loss of fingers, slight defects in vision, hay fever, etc. In "Caterpillar's" handicapped group are only those who are really handicapped, with loss of one or both extremities, marked deformities, loss of one or both eyes, loss of hearing and speech, and those with healed tuberculosis, heart disease, etc. The classification after all is unimportant except that some uniform plan would help in the formation of a nation-wide program.

At present, "Caterpillar" has approximately 800

THE PEORIA PLAN
for
HUMAN REHABILITATION, CIVILIAN AND MILITARY
IN GREATER PEORIA



DEPARTMENT RESPONSIBILITIES IN PROGRAM OF EMPLOYMENT OF HANDICAPPED

INDUSTRIAL RELATIONS DEPARTMENT

MEDICAL DIVISION	PERSONNEL DIVISION	SAFETY DIVISION
Physical examination Consultation	Personal interview Placement and job explanation	Accident hazards of job and working area

TRAINING DEPARTMENT	MANUFACTURING DEPARTMENT
Supervisors' conference and training Train job instructors Vestibule shops	Job training by foremen or job instructors

such handicapped employees, and this number is remarkable when consideration is given to the fact that it builds heavy machinery, calling for heavy and light machine work, similar types of assembling, and grey iron and aluminum foundry work.

State compensation laws must be considered, and some changes would relieve the employer of carrying all the risk. Steps are now being taken to overcome this objection, in order that more with handicaps will be able to obtain gainful occupations.

Those suffering from nervous disorders returning from military service will present a problem of some magnitude, but certainly many of these individuals will recover if we are able quickly to absorb them into an occupation which will convince them that they are fully capable of caring for themselves and their dependents. Days of calling upon one employer after another, weeks of disappointments and indecisions will only aggravate his condition, forcing such a man to accept any aid available for his livelihood. Many cases of this type will require special medical care and vocational training.

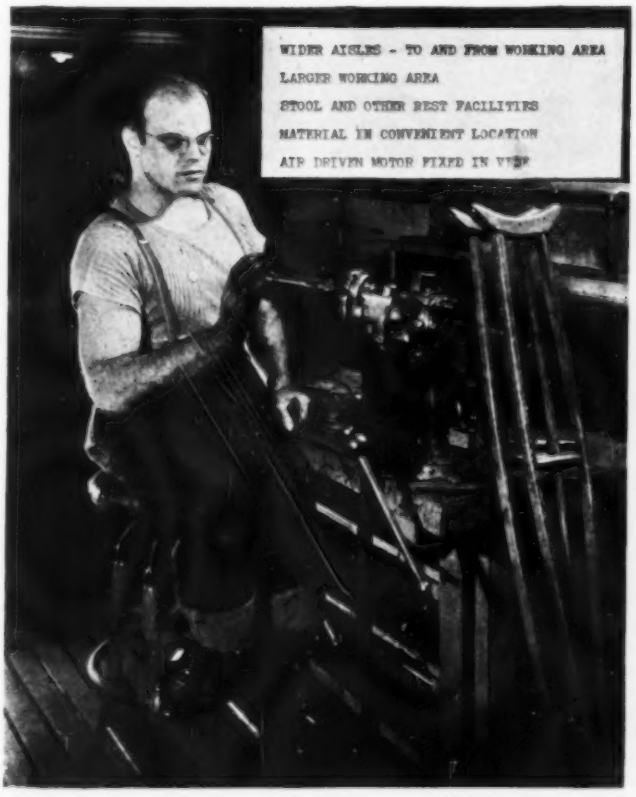
After "Caterpillar" assured itself of the success of this program in its plant, it was felt that the plan should be carried forward to the community. The idea was offered to the Peoria Manufacturing Association, and from this came the "The Peoria Plan for Human Rehabilitation—Civilian and Military" which we believe is the first to be established in a community with a complete working organization. This plan is unique because the many employers in the Peoria area were organized and made ready to accept the physically handicapped. Usually, the in-take groups are forced to approach industries and other employers with a plea for opportunities for the persons with physical handicaps.

The Peoria Plan comprises an Executive Committee, with representatives of all the interested groups in the community; American Legion, Disabled American Veterans, Mothers' and Fathers' Service Clubs, Manufacturing Groups, Retailers, Unions, Junior Chamber of Commerce, Associations of Commerce, Ministerial Association, Catholic Priests, Red Cross, Schools, Mothers' Clubs, Farm Bureau, and Federal, State, County and City Agencies.

Sub-committees were formed, and now an office is being equipped, clerical help being donated by the Red Cross; and a counselor is being employed, who will first investigate cases, and then confer with a steering committee which will place each returned man in the proper classification for immediate or eventual employment.

In conclusion let us briefly summarize the outstanding points of this program:

1. Now is the time to organize—do not wait until the disabled veterans return from the war.


WIDER AISLES - TO AND FROM WORKING AREA
LARGER WORKING AREA
STOOL AND OTHER REST FACILITIES
MATERIAL IN CONVENIENT LOCATION

The environment fitted to the man

A good hand in a tool room

2. A well organized program in each company is necessary for success. In many organizations, this consists of close cooperation between Medical, Personnel, Training, and Safety Divisions, and Supervisors.

3. A survey of jobs is essential.

4. Employers of small groups can participate because of first-hand knowledge of their jobs.

5. The production, safety and absentee record of the physically handicapped is above average.

6. State compensation laws could be changed to benefit the program.

7. Classification of handicapped individuals should be clarified.

8. "War neurosis" cases will benefit from quick employment with special attention given to individual cases.

9. We recommend to other communities their sincere consideration of "The Peoria Plan" (a booklet describing this plan is now being prepared).

"The Peoria Plan" for human rehabilitation is a fine humanitarian program which gives to every individual the opportunity to receive his "God-Given Rights" to care for himself and his dependents. Above all, it demonstrates the willingness of all concerned to contribute their share in making the United States of America the outstanding example of true democracy.

[NOTE: The sound film "Winning Against Odds," 16 mm., showing "The Peoria Plan" in operation will be sent on loan to interested organizations. For the film, and the descriptive booklet above mentioned, address DR. H. A. VONACHEN at Caterpillar Tractor, Peoria, Illinois.]

Second Successful Course

LONG ISLAND COLLEGE OF MEDICINE completed its second Post-Graduate Course in Industrial Medicine November 12. A total of 72 matriculants took the course, of whom 47 were enrolled for full time. Of these, 51 were physicians, 10 registered nurses and 11 industrial observers. Four representatives of the Army and Navy were also enrolled. States represented among the registrants were New York, New Jersey, Ohio, Connecticut and Massachusetts, Among the companies from which members of medical staffs enrolled were the Babcock & Wilcox Company, Brooklyn Union Gas Company, Mergenthaler Linotype Company, National Biscuit Company, Travelers Insurance Company, E. R. Squibb & Company, and Todd Shipyards. Of those who completed the course, 18 were placed with various industrial concerns for periods running from one week to four weeks beginning November 15. The companies where these are being served are American Cyanamid Co., Bell Laboratories, Consolidated Edison Co., Merck & Co., Inc., Norton Company and Western Electric Co. As only five were placed following the course last year, it is clear that this is becoming a highly important development in post-graduate training experience in industrial medicine. The industrial physicians under whom the matriculants served last year felt that it was useful to them, also, to have trainees, as it helped them to re-study their departments regarding what they could offer to a man seeking industrial medical experience. The experience will range all the way from observation of procedures to actual participation in the work of the department. The industrial physicians' register which the College established last spring as a service to industry has been consulted by some 12 firms and a number of placements have been effected through this register.

A binder containing the complete texts of the lectures is being prepared and will be available for purchase from the College after December 31.

Radium Painting

—Hazards and Precautions—

KENNETH M. MORSE, M.S.,
Industrial Hygiene Engineer, Division of Industrial Hygiene, and
MILTON H. KRONENBERG, M.D.,
Chief, Division of Industrial Hygiene, Illinois State Department of Health

THE publicity given to deaths from radium poisoning in several states, resulting from painting in the last war, has today made radium dial painting the most feared occupation among many women. No plants, in our experience, have a greater labor turnover than those engaged in radium dial painting.

The use of radium paint is not any more dangerous than the use of benzol and the many other very toxic materials employed in industry. Any hazardous material can be employed, provided certain safeguards are instituted and maintained. In the case of radium, these safeguards are rather extensive and must be rigidly maintained and enforced. Today, there is no excuse for any one not knowing these requirements. Once having provided these measures, radium dial painting can be safely conducted without the great fear and concern expressed among some workers and plant managements. This is not intended to deprecate the hazards involved in radium dial painting but to attempt to quiet some of the near-hysteria which exists in some places concerning the work. One has only to view Martland's[1] compilation of deaths from radium paint to appreciate the serious hazards resulting from uncontrolled radium dial painting practices. These are shown in Table I. However, one must also realize that girls pointed brushes in their mouths in those days and thus ingested great quantities of radium paint.

TABLE I.
DURATION OF LIFE, AFTER EXPOSURE HAS CEASED, IN THE NEW JERSEY DIAL PAINTERS. ESTIMATED AMOUNTS OF RADIUM FOUND

Case No.	Duration of life after leaving industry (years)	Amount of Radium in bodies (micrograms)	Type of Tumour	Age at death (years)
1	2	Not estimated	Periosteal fibrosarcoma	20
2	7	50	Osteochondros sarcoma	32
3	11	12	Osteogenic-sarcoma, medullary and periosteal	34
4	8	6	Ditto	27
5	10	8	Ditto	30
6	11	18	Ditto	31
7	12	41	Ditto	34
8	14	3	Ditto	31
9	12	0.5	Ditto	40
10	14	2	Carcinoma of ethmoid	38

From: Occupational Tumours (Bones), by Dr. Harrison S. Martland Newark, New Jersey.

Radium luminous dial painting was performed during the last war without the benefit of advice from physicians and physicists as to the hazards and precautions involved. Consequently, conditions and practices existed in the plants which today would cause horror; for example, pointing brushes in the mouth and dusting. As a result of the previous disastrous experience, recommendations for the safe conduct of this work have been developed mainly based upon practices conducted in the past. It is quite possible that these requirements have a large factor of safety. This is advantageous and commendable; however, the safety factor should not bring these requirements too far beyond the proof of scientific irrefutable fact and not upon the opinions of physicists or physicians who have done little study of modern operations.

Presented at National Safety Congress, Aeronautical Section, Chicago, October, 1943.

Knowledge of the operations and hazards involved in present-day dial painting must be available before the hazards can be fully understood and control measures applied. Physicists, upon whose profession the evaluation of the problem rests, are not in accord with the generally accepted tolerance values. This has been partially brought about by the fact that there are only a handful of physicists who have knowledge of the problem. The great need today, and for future radium luminous painting operations, is for an extensive field study to determine the hazards under present conditions and the efficacy or inefficiency of present control measures. Based upon this study, a factual set of recommendations can be developed. Such a study has been under way during the past year by the U. S. Public Health Service, Division of Industrial Hygiene, and is being conducted by Dr. Frank Hoecker, Senior Physicist of that agency. Much is expected from this study and will no doubt be provided.

The Division of Industrial Hygiene of the Illinois State Department of Public Health has been cooperating with the U. S. Public Health Service in this study. It is our purpose here to report on our initial findings in Illinois and the necessary precautionary measures which we feel are indicated. It is important to emphasize that these opinions are based on preliminary data, and only through continued study, which we plan, will positive opinions be possible. There is much to be learned about the hazards of radium as applied to dial painting.

Toxicity of Radium

RADIUM, being one of the heavier metals, produces effects in the human body when inhaled or ingested, similar to those of any other heavy metal. It is stored and eliminated from the body quite identically as with lead. Almost all the radium deposited in the body is found in the bones. The toxicity of deposited radium is due entirely to the radiations which consist in most part (92%) of alpha rays. The beta and gamma radiation is believed to produce little effect. It is said[1] that this incessant alpha bombardment constantly irritates the bone marrow and the blood forming centers. This internal bombardment is continuous throughout life. Radium, when first deposited in the body, will be in the blood stream and soft tissues before it becomes permanently fixed in the skeleton. In this state, it can be eliminated to a large extent by placing the individual on a low calcium diet and instituting a mild acidosis. This is similar to the procedure for de-leading workers.

Deaths from radium have not only occurred from the inhalation and ingestion of radium and its disintegration products, but also from the intravenous and oral administration of large amounts of radioactive substances as a cure for certain diseases of the body. It has been said[2] that acute radium poisoning occurs when about 10-100 micrograms of radium is deposited in the bones, and clinical symptoms may appear within a year or two. However, this type of poisoning is rare today. Chronic radium poisoning is believed to occur when 1-10 micrograms of radium is deposited and fixed in the bones and no clinical symptoms generally appear until some five to 15 years after this deposit has developed. Poisoning of this type is the problem today.

The importance of immediately determining radium in the body is apparent in order that it may be eliminated before it becomes fixed. As in the case of all industrial poisoning, inhalation of the poison is more dangerous than ingestion. However, it is important to know the relative amounts which enter the body by either channel before either can be classed as more significant in industry.

Tolerance Values

A FEW years ago, a committee chosen by the National Bureau of Standards set the tolerance value for radon in the room air at 10^{-11} curies per liter of air. It has been said that this value has been based on a comparatively small amount of evidence and that 10^{-10}, which is 10 times this, would be a safe tolerance. In England, 10^{-10} curies of radon per liter of air appears to be the accepted tolerance. In view of this information, it does seem reasonable that our value has possibly been set too high and that it should be re-evaluated by those physicists and others with knowledge of the problem at hand.

There is less tendency to question the tolerance value of 0.1 micrograms of deposited radium or the 10^{-12} curies of radon per liter tolerance for breath radon content. However, English authorities[3] have proposed a 10^{-11} value which again represents a value 10 times that generally recommended in this country. These English authorities state that, in drawing up any recommendation for the safe maximum amount of radium in the body, it should be borne in mind that normal human tissues contain some radium in the order of magnitude of 0.015 micrograms. Limited information has shown the radon content of outside air about Chicago to vary from $.045—.20 \times 10^{-12}$ curies per liter with a mean of $.10 \times 10^{-12}$ curies per liter of air.[4] In setting the standard in this country, great significance was given to the radium deposited in the body of individuals who had died in the New Jersey disaster. However, little, if any knowledge was had of the initial radium deposits, in these individuals, whose alpha emanation had done much of the damage. Today, it does seem that our problem is different in that we can be informed of the initial deposition when it occurs. Therefore, it appears that a re-evaluation of the tolerance value for deposited radium should be undertaken. However, we are inclined to desire a larger safety factor in setting this tolerance value than in the room air tolerance.

It is necessary that these tolerances be reasonably set but with utmost consideration for the health of the workers. Controversial opinions regarding tolerance values in the order of magnitude of 10 to one means considerable regarding the physical requirements for control measures. Therefore, it would seem that these tolerances should have reasonable scientific proof for their adherence before they are advanced as final.

The tolerance value for exposure to gamma rays has been based upon more scientific evidence than the other tolerances. This is set at 0.1 r (roentgen) per eight hours or no more than 3 roentgens per month. Since the effect of gamma rays is accumulative, this maximum monthly exposure may be taken in a day, a week, or other period provided the exposure is discontinued until the month has elapsed.

Instruments for Evaluating Hazards

THE evaluation of the exposures and hazards in radium dial painting operations require the use of special instruments operated by skilled physicists or others specially trained in their application. These instruments consist of those employed in the field for the measurement of gamma radiation and those employed in the laboratory for radon analyses.

GAMMA RADIATION: The instruments available for the measurement of gamma radiation are the Geiger-Müller Counter, the Victoreen Minometer[5] and the Lauritzen Electrometer.[6] The latter two instruments are small and extremely portable, and are best employed for measuring gamma radiation at various work stations. The Victoreen Minometer is simpler to operate and can be supplied with 0.01 or 0.10 roentgen cham-

bers. The Lauritzen Electrometer is a more sensitive instrument and, therefore, many more readings can be obtained in the same time interval than can be made with the Victoreen Minometer. Both instruments require great care in their use, particularly the Lauritzen Electrometer, in order that the fine quartz fiber, used in recording, will not be broken by jarring, overexposure of the chamber, and temperature extremes.

In our experience, the best use for the Geiger-Müller Counter is in measuring the extent and magnitude of body and clothing contamination. Aside from this use, the above mentioned simpler, more portable and less expensive instruments are far better for field use.

RADON TESTS: Radon tests are far more significant than gamma ray measurements. These tests require extensive equipment and a great deal of experience in this type of analyses. There are few laboratories for such analyses. There is no field equipment for conducting these tests at the plant or in other field locations. The most common method for determining radon was to measure the ion current produced in a gas when the radon mixed with the gas is introduced into an ionization chamber. This method is said to have several disadvantages, and to meet them a more recent method[7] has been developed in which the alpha particles from the radon, radium-A and radium-C are counted in an ion counting chamber.

State Regulations

THERE are no state codes with which we are familiar, which regulate the radium dial painting industry. New York and Massachusetts have prepared tentative codes, but there has been difficulty in their acceptance as statutory labor laws due, in part, to the lack of unanimity of opinion regarding tolerance values. They have been used as recommended standards for the industry. In Illinois, no code exists at present, although one is contemplated. A set of recommended standards for the industry may possibly serve a better purpose, as it could contain much that could not be enforced in a code, but would serve to excellent educational advantage. Today, the industry is well aware of the danger of radium paint and, with the vigilance practiced by their insurance carriers, it appears that education in the methods of control is more necessary than a code which is only the result of compromise between all interests.

Hazards of Radium Luminous Painting

RADIUM is one of a group of radioactive materials whose atoms disintegrate spontaneously in varying rates and amounts. This process of continuous spontaneous disintegration is called radioactivity and is accompanied by the emission of large amounts of energy which, in the case of radium luminous paint, activates the zinc sulfide to a required range of luminosity. This disintegration process results, in each step, in the formation of new compounds until finally an atom of lead is formed. Nothing known to science can stop or impede this disintegration process. The radium disintegration series is shown in Fig. 1.

The hazards of radium luminous material are ever present and exist whether the material is in wet paint, dry paint or in powder form. Some plants have, in the past, been under the impression that the paint after drying, presented no hazard. This is erroneous, and a dangerous assumption, which may have arisen from the fact that coating materials are generally not hazardous once they are applied.

The danger with radium paint rests not only with the specific toxicity of the material but also with the fact that such minute amounts—one ten millionth of a gram of radium—are considered dangerous. This

Substance	Emission	State
Radium	alpha	Solid
Radon	alpha	Gas
Radium A	alpha	Solid
Radium B	beta, gamma	Solid
Radium C	beta, gamma	Solid
Radium C^1	alpha	Solid
Radium D	beta, gamma	Solid
Radium E	beta, gamma	Solid
Radium F	alpha	Solid
Lead		Solid

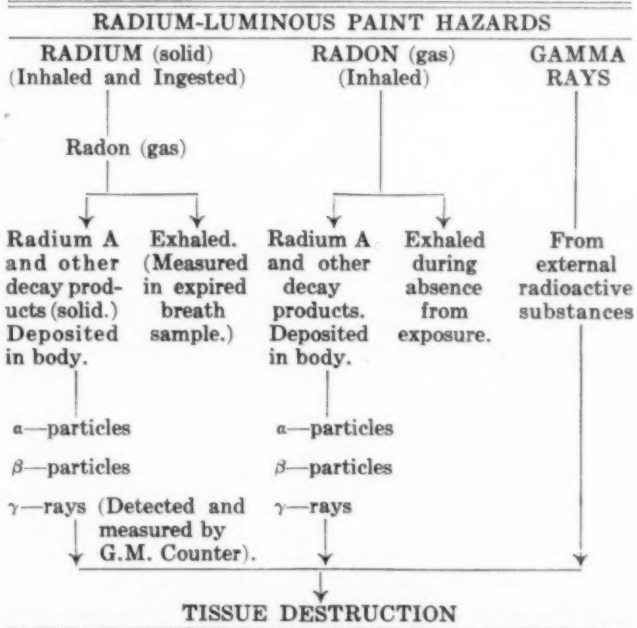
Fig. 1

fact makes the housekeeping and personal hygiene problems, which are so important to safe painting, very difficult to practice and their great importance difficult to understand. Each gram of 38 microlambert paint contains approximately 50 micrograms of radium, or, in other words, 500 times the maximum amount which can be safely deposited in the body.

The hazards associated with radioactive paint may be classified as follows:

1. The inhalation of the dust.
2. The ingestion of the dust.
3. The inhalation of radon gas.
4. Exposure to gamma radiation.

These hazards result in external radiation and internal radiation. The latter, due to inhaled or ingested radium luminous paint and inhaled radon, is by far the greatest danger. The solid radioactive materials which remain in the body are finally deposited in the bones. From this site, the alpha rays bombard the blood-producing centers, the bone-building cells and



Frank E. Hoecker: "Properties and Hazards of Radium Luminous Paint."

Fig. 2

the bone structure, and can result in cell damage and damage to the blood producing centers.

The hazards of radium luminous paint may be represented graphically, as shown in Fig. 2. The path of the inhaled or ingested dust or radon is revealed, as well as the method for its detection.

Inhalation of Dust

THE inhalation of radium luminous dust can easily be controlled by the application of mechanical ventilation to all work areas where such dust is liberated. It is felt that in dial painting, per se, with small amounts of paint, the greater danger arises from ingesting radium compound from contaminated hands. One must not forget, however, that in present-day dial painting plants there are many operations aside from dial painting.

MIXING: The mixing of radium luminous paint from the powder can release a great deal of dust or very little, depending upon the care and experience of the painter. If one gram of powder is mixed at a time, with caution taken to prevent its free fall into the mixing crucible, and mixing is slow until the material is wetted, little dust will result. The requirement of mechanical ventilation at this procedure can be questioned. However, since the human factor is involved, it is advisable to provide ventilation for such routine mixing. The routine mixing of large amounts of paint where more than a gram of powder is handled at one time unquestionably requires localized ventilation.

It does appear to be quite possible to follow the careful mixing procedure above mentioned without the ingestion of excessive amounts of radium. Later in this report, breath samples on old dial painters who have done routine mixing of small amounts of paint in a plant which has never had table ventilation, will be shown to be remarkably low considering what one would at first expect.

WEIGHING: The weighing of small amounts of radium luminous powder from bulk supplies is practiced in some dial painting plants. This procedure is extremely hazardous because of the several manual movements with the powder that are required with each weighed amount. Today, with the powder available in one gram vials, this operation should be discontinued or prohibited. There is nothing gained by continuing an operation which involves a severe potential health hazard and which is not indicated by economical plant operation.

SCRAPING: In several plants inclinometer backings are painted. The wet paint runs through small openings onto the back of the backing. This is scraped off after the paint has dried and the operation releases a great deal of dust. In addition, paint is also removed from the sides of the backing by scraping with a sharp-edged instrument. In our experience this is one of the most hazardous operations in the industry. Unless this operation can be done wet it should be performed in front of a mechanical exhaust hood at all times.

Inspection work, in which small imperfections on dials are removed, is sometimes done by a razor or other sharp instrument. This also should only be performed at a mechanical exhaust hood.

CARDING: There are operations in which paint is applied with a spatula into recessed numbers on a circular dial and the excess wiped off with a cloth which has been moistened with solvent. The solvent removes some of the adhesive in the paint, and the powder which remains can easily be liberated into the air when the cloth is reused. The continued use of these cloths can produce a major dust hazard.

BLOWING-OFF: There are plants which allow workers to employ an air hose to blow dust off of dials, especially after the excess paint has been scraped off. Air hoses should be rigidly prohibited in dial painting plants for any purposes in radium rooms, in order to prevent the liberation of dust into the air from tables or booths, or from coated work.

SILK SCREENING: Today, the silk screening operation is being conducted in some plants, for it considerably increases the production of coated dials. This operation has been viewed with considerable concern. It is true that screening presents additional problems; however, they can be controlled to allow the safe conduct of this work.

The dust hazards are present mainly from the mixing of the paint, from the paint which may dry on the screen, and in the cleaning of the screen. The amount of the paint mixed at a time is generally 10 grams, and considerable dust may be liberated if this is done without adequate control, or if done carelessly. Cleaning of the screens should be carefully conducted, and under no condition should the paint be removed while dry.

INCLINOMETER ASSEMBLY: Small wires are used in attaching the radium painted backing to the inclinometer. These wires are twisted to hold the inclinometer. Part of the wire is coated with radium paint and, in the twisting operation, part of this paint may be flaked off or otherwise liberated into the air.

CLEANING: Cleaning operations can easily provide the greatest exposure in a radium dial painting plant. The cleaning of tables, crucibles, floors, walls and equipment should never be performed with a brush, dry cloth or any dry method. This work should always be conducted wet, and the cloths that are employed should be disposed of after each use.

The removal of wiping cloths or tissues from metal containers can also provide an excessive exposure to dust, particularly if this job is left to the same individual each day. This dust exposure can be eliminated by employing paper bags at each table and disposing of them daily. This eliminates the handling of the cloths or tissues.

Inhalation of Radon

RADON is continuously liberated from radium luminous compound whether it is in a wet, dry or powdered form. This gas will contaminate the room air unless it is sealed in containers or in adequately ventilated chambers.

Only a fraction of the radon that is formed in the paint or powder escapes into the air. This fraction is known as the "emanating power" of the solid. Radon is formed in the solid at the rate of 2.1×10^{-6} curie per second per gram of radium. It is claimed that the emanating power of the present-day dry compound is 15-20% for dry paint, and about 30% for wet paint. Hemeon and Evans[8] have shown that 34 cubic feet of air per minute are required to control the radon emanating from 5 grams of 38 microlambert paint, based upon the tolerance value of 10^{-11} curies of radon per liter of air. This would imply only 3.4 cubic feet per minute, if the 10^{-10} tolerance was used, for diluting the radon content to within the safe limit. Based upon this latter tolerance, natural ventilation, even in the winter, would probably be ample to maintain the radon content within tolerance, provided distribution of the air is provided and the painting room has several windows.

The ventilation rate which is advocated by Hemeon and Evans has been based upon 5 grams of paint. Today the safe conduct of radium dial painting necessitates, among other measures, the use of as small an amount of paint as practical. The plants in Illinois are generally allowing dial painters to handle no more than 2 grams at a time and the painted work is brought

to a dryer before more paint is secured. The use of 2 grams of paint would require about 14 cubic feet of air per minute for radon dilution if the lower tolerance is used and 1.4 if the 10^{-10} tolerance is considered safe. This ventilation could in all probability be provided by natural ventilation. In any event, it does not appear that table ventilation is necessary for the control of radon alone. Mechanical ventilation, if necessary, could be of the general type.

Ten air samples were taken in our study for radon analyses by the U. S. Bureau of Standards, from seven plants of which six were engaged in dial painting and one only in assembly. The results of these analyses are shown in Table II. Six of these samples were above the tolerance value of 10^{-11} curies per liter of air. It can be said that these values represent room air concentrations at a time when the full benefits of natural ventilation were obtainable and that during the winter the radon content may be higher. This question will be clarified this winter when repeat samples will be taken.

TABLE II.
ROOM RADON SAMPLES

Plant	Table Ventilation	Date Taken	Location	Percent of safe tolerance	Remarks
A	Yes	6-21-43	Painting backing	115	27-40 gms. of paint at this table.
		6-21-43	General room air	80	
B	No	6-26-43	Inclinometer Assembly	122	40-60 gms. of paint. Room is air conditioned with 90% recirculated air.
C	Yes	8- 3-43	General room air	54	
D	Yes	6- 9-43	Weighing room	171	Weigher's breathing zone.
E	No	6-17-43	Painting room	106	General room air.
		7- 1-43	Painting room	92	Breathing zone of a dial painter.
F	Yes	6- 1-43	Painting room	187	Breathing zone of typical painter.
		6- 1-43	Screening	149	Breathing zone of screen operator.
G	Yes	7-14-43	General room air	31	

Plant E is of special interest. This plant has been engaged in dial painting for several years. It has never had mechanical ventilation at tables, but has had some general mechanical ventilation. Paint is kept under rigid control and rarely does a girl get more than 2 grams at a time. Housekeeping is also very good. It will be noted that the average of the two room air samples is within the safe tolerance of 10^{-11} curies per liter of air.

Several of the new dial painting plants are contemplating peacetime production. In the past, radium luminous paint used in watch dials has been about 11 M (microlambert). The radon released from this paint would be approximately of a proportionate amount to that emanating from the 38 M material. Consequently, about 12 cubic feet of air per minute for each 5 grams of this paint would be required for diluting the radon to a 10^{-11} tolerance, and 1.2 cubic feet per minute to a 10^{-10} tolerance. It seems even more convincing in this case that mechanical ventilation should not be necessary if the work is located in a room where good natural ventilation can be obtained.

Ingestion of Dust

THE ingestion of radium dust, particularly from contaminated hands, is, in our experience, the greatest problem existing in the safe conduct of present-day radium dial painting as seen in our initial findings. There is a great obligation of dial painters toward their own health. No degree of mechanical control of the plant will prove effective if painters eat with contaminated hands, bite nails, or place their fingers on their lips, tongues, or in their mouths. It is felt that this factor may be a major reason for the findings of Evans, that under the best conditions now existing in the radium industry, 15% of the workers will accumulate more than the tolerance dose of radium (0.1 micrograms). Even the most meticulous painter contaminates her hands. This paint dries in the pores and sticks to the hands because of the adhesive in the paint. We have found that even the best previously practiced personal hygiene will not remove this paint unless one washes with solvent and scrubs the hands with soap and warm water for about five minutes with a brush, in order to remove the paint under the nails and under the cuticle. It is difficult to convince girls as to the necessity for this thorough practice. The type of hand washing required is comparable to that in surgical cleanliness.

In our investigation, workers were seated at the Geiger-Müller Counter after having washed according to their usual practice. The counter showed a high count when the painter sat down at the instrument and placed her hands on the tube. Upon placing the hands behind her back, the instrument returned almost to normal. In several cases, painters had to be sent back to again wash their hands three to four times before the paint was removed. Finally a procedure had to be instituted where we required the painters to wash for five minutes with a hand brush before conducting a test.

Almost any operation in a dial painting plant contaminates the hands with radium paint. One operation in which the hands become heavily contaminated is the painting of inclinometer backings. This job is usually done by holding the backing between the thumb and index or middle finger. This practice results in getting a good deal of paint on the tips of these fingers. As yet, a suitable holder has not been developed for this work. In the interim, however, light rubber finger guards should be worn by the painter chiefly to prevent the accumulation of paint under the nails and cuticles.

The practice of wiping excess paint off the circular dials in the carding operation, previously mentioned, likewise heavily contaminates the hands of the painter. In this job, both hands become coated with large amounts of paint. Rubber finger guards are also indicated here.

We have noted that many painters, particularly the more recent ones, have a practice of pointing the brush on their bare hands or fingers. Supervisors should constantly be on the alert for this poor practice and immediately prohibit its continuance. Another factor enhancing the contamination of hands is crucibles and solvent containers which are too deep and have a too narrow mouth. As a result of their use, the brush handle becomes contaminated with paint. The painter gets this on her thumb, index and middle fingers as she again holds the brush handle close to the brush in her normal painting position. One of the best types of paint crucible that we have seen is shown in Fig. 3. It has a mouth of $\frac{13}{16}$ inches in diameter and a depth of $\frac{7}{32}$ inches. This is ample for the mixing of small

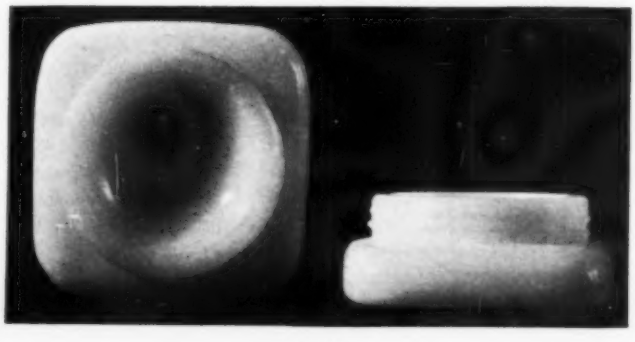


Fig. 3

amounts of paint. Other types of satisfactory crucibles are available. One should choose a crucible and solvent container which will not allow the brush handle to be inserted below the mouth of the container. Dial painting can be done with very little contamination of the hands with paint.

The supervisory problem in radium dial painting is very important. Extreme vigilance must be practiced to note personal habits of the painters which are dangerous in the work. We found a few nail biters and all revealed high breath samples. Supervisors must take particular care to note if girls are nail biters. This practice is particularly dangerous, and girls so found should be released unless the practice is immediately discontinued, and, if detected prior to employment, they should not be employed. The habit of wiping the corners of the mouth or the lips with the hand is a poor practice and should likewise be prohibited.

We have found, by means of the Geiger-Müller Counter, an unusual amount of clothing and hair contamination among some girls who had worn smocks. This contamination extended to clothing and underclothing which had not been worn in the plant before. This paint is liberated into the air about the workers' mouth when she removes her dress, particularly if it is pulled over her head. This source of ingestion or inhalation may be unrecognized and seem unimportant. However, one need only realize that the present tolerance for radium is generally accepted at one-ten millionth of a gram, and a gram of 38 M paint contains about 500 times this amount of radium.

Forty-three breath samples were obtained from 35 workers in plants in this state, for radon analyses.

TABLE III.
BREATH RADON SAMPLES

Plant	Worker	Time in Industry		Breath Radon Percent of safe Radon Tolerance
		Yrs.	Mos.	
A	HR	0	6	242
	LP	0	6	1490
	LP	..	..	64
B	MP	0	6	621
C	BY	0	8	400
	MW	0	7	71
	SJ	0	10	114
	FD	1	3	197
	MC	0	10	26
D	FR	5	6	77
	FS	0	6	98
	MD	6	0	56
E	DP	1	0	44
	RS	2	0	246
	SR	2	0	258
	MC	1	0	15
	AF	1	0	62
	MW	8	0	53
	RC	0	6	139, 155
	AW	8	0	355
	GE	1	0	122, 190
	AH	20	0	194
	MJ	2	6	64, 198
	FP	16	0	241
	MW	19	0	912
	EP	17	0	99
	LM	3	0	6
	MB	4	0	82
F	MC	0	7	84
	PR	0	4	4
	KD	0	5	15, 13
	RS	0	9	6
	MR	0	6	52
	MW	0	9	101
G	MD	0	3	24
	GB	0	9	5330, 284, 166, 175

The results of these tests are shown in Table III. One will note a wide variance in results in most plants. We are of the opinion that, in general, this is due to varied thoroughness of personal hygiene.

Twenty-one samples (49%) were above the tolerance value and 22 samples (51%) were below the tolerance value. The results, considered from the viewpoint of service, revealed the following data:

Years of work	No.	Number and percent of workers above tolerance	
		No.	Percent
1 and less	24	8	33
1—5	7	5	71
5 and over	8	4	50

In Plant A, one worker (L. P.) was found painting and scraping backings. After a two-week vacation, her breath sample dropped from 1490% of tolerance to 64% of tolerance. Plant E provides no table ventilation for painters and has been operating for many years. One will note that some operators with 16, 17, and 20 years at the work showed only 241%, 99% and 194% of the tolerance value for breath radon, despite the fact that these painters had pointed brushes in their mouths in the early days. On the other hand, girls with considerable less experience show higher breath samples. This, we feel, is due to a large degree to variances in personal hygiene for this plant does not have rigid supervision of hand washing and little hand inspection with an ultra-violet lamp.

This plant (E) also does dry weighing of radium luminous powder. The weighers work at mechanically ventilated booths and are rotated so as to weigh once every four months. One weigher had a breath sample of 64% of tolerance before weighing, and 198% of tolerance after weighing; another girl showed 122% before, and 190% after her month at weighing. We feel that this is ample evidence to prohibit the work, for not only is there a definite increase of radium in the body but also the danger of greater increases in body radium is too great.

Plant G was found to have employed a worker with a history of dial painting during 1922-23 and who gave a history of pointing brushes in her mouth. A breath sample showed 5330% of tolerance, a second sample four weeks later showed only 284% of tolerance; another three weeks later, after 64 hours away from work, revealed only 166% of tolerance. The final breath test, about three weeks after the third test, showed 175% of tolerance. All tests were made while the girl remained at work. It was concluded from these tests that this woman had accidentally inhaled or ingested some paint and was eliminating it rapidly. This woman was performing all the mixing and also was supervisor. These jobs required her to hurry at times and she, no doubt, had been careless.

The worker in plant B (M. P.) who revealed a breath sample of 621% of tolerance was an inclinometer assembler, and twisted radium painted wires. A subsequent sample on this girl a week later has shown a drop of 184% of tolerance. During this period the girl remained on the job. We have concluded that this girl also ingested some paint because of the rapid elimination which she demonstrated.

The data on L. P. (plant A), M. P. (plant B) and G. B. (plant G) reveals interesting information on the elimination of ingested radium paint. It does appear that the elimination is rapid even when remaining at work, provided the ingestion is not continuous. However, elimination appears to be more rapid if the worker is removed from the job as demonstrated by L. P. (plant A).

Gamma Radiation

IT IS NOT felt that present-day radium dial painting operations present any excessive exposure to gamma rays provided the supply of radium luminous powder is kept at least 10 feet from any worker in a ¼ inch lead-lined container and the supply kept within 2500

grams of paint. Distance is a far better means of protection than lead. Tables IV and V, compiled by Evans, relate the relative effectiveness of protection by lead and distance.

TABLE IV.
EFFECT OF DISTANCE IN PROTECTING PERSONNEL FROM RADIUM GAMMA RAYS

Distance in feet	1	2	3	4	5	10	25	50
Per cent of gamma ray dosage	100	25	11	6	4	1	0.16	0.04

TABLE V.
EFFECT OF LEAD SHIELDING IN PROTECTING PERSONNEL FROM RADIUM GAMMA RAYS

Inches of lead	0	⅛	¼	½	1	2	3	4	5
Per cent of gamma rays transmitted	100	80	64	43	21	5.8	1.7	0.50	0.17

One hundred and twelve gamma ray measurements were made in seven plants in Illinois with the use of the Lauritzen Electrometer. The results of these tests are shown in Table VI. It is evident from these results that the problem of excessive gamma ray exposure can easily be made of minor significance. The few findings which approached the tolerance value of 0.1 roentgens per day was due to a very great accumulation of paint. When the excess material was removed, the exposure fell well within the tolerance. One need only prevent mass accumulation of material to insure a low gamma ray exposure. Therefore, routine periodic gamma ray measurements at frequent intervals are not indicated if the above precaution is enforced.

Gamma ray measurements to determine the amount of radioactive material deposited in the body are of little value because the procedure is not accurate for deposited amounts even four times in excess of tolerance and, furthermore, one can not definitely determine whether the result is due to deposited radium or body, clothing, hair or hand contamination. The only accurate index of deposited radioactive material is the results of breath radon samples.

Precautionary Measures

THE precautionary measures, although extensive, are not particularly expensive. However, it is important that they be rigidly and sincerely applied. These measures may be considered under the following divisions:

1. Plant layout and construction.
2. Personal hygiene.
3. Housekeeping.
4. Ventilation.
5. Selection, supervision and instruction of workers.
6. Medical.
7. Routine tests.

All of these measures are important, but in our experience rigid personal hygiene, housekeeping and routine breath tests are the more vital measures. This is based upon our opinions, gained from the radium dial plants in Illinois, that the ingestion of radium paint appears to be the greatest problem in present modern dial painting plants. It is hoped that the study now being conducted by the U. S. Public Health Service will provide extensive information on this problem.

Every plant engaged in radium painting should have its supervisory personnel secure and carefully digest the National Bureau of Standards Handbook H27 entitled "Safe Handling of Radioactive Luminous Compound." Although this pamphlet has omitted several important present-day problems, such as screening, it nevertheless provides excellent fundamental control procedures.

PLANT LAYOUT AND CONSTRUCTION: The first step in safe radium dial painting operations is to locate the operations in a room free of non-impervious materials such as wood. Floors should preferably be of cement or linoleum covering. Walls and ceilings should have a hard impervious surface which can easily be cleaned. This is important in order that radioactive solids may not adhere to surfaces and be difficult to remove. Radon may be absorbed and be continuously given off

TABLE VI.
GAMMA RAY MEASUREMENTS

Plant	Station	No. of Tests	Gamma Ray Intensities (roentgens per 8 hrs.) Max.	Min.	Ave.	Remarks
A	Dial Painting	19	0.09	0.01	0.02	
	Backing Painting	1	—	—	0.12*	*80 backings equivalent to 27-40 gms. of paint was at this table.
	Dryer	1	—	—	0.03	
	Office	1	—	—	0.03**	**1500 gms. in ¼ inch lead was 8 feet from this Station.
	Packing	1	—	—	.002	
B	Instrument Assembly	6	0.03	0.01	0.02	
	Inclinometer Assembly	1	—	—	0.04	
	Stock Room	1	—	—	0.01	
C	Dial Painting	8	0.04	0.01	0.02	
	Dry Cabinet	2	0.12	0.09	0.11*	*160 gms. in one dryer, 80 gms. of paint in other. Both cabinets had no lead lining.
	Final Inst. Inspection	2	0.005	0.005	0.005	
	Inclinometer Assembly	1	—	—	0.04	
	Dial and Pointer Assembly	1	—	—	0.01	
	Stock Room	2	0.20	0.13	0.17**	**4300 gsm. of paint.
D	Dial Painting	6	0.017	0.012	0.013	
	Weighing Table	3	0.13	0.07	0.10*	*Weighs radium luminous powder.
	Center of Weigh Room	1	—	—	0.02	
	7 Ft. from Supply	1	—	—	0.04**	**7000 gsm. in ¼ inch lead lined steel safe.
	Packing and Shipping	2	0.2	0.1	0.015	
	Dark Room	1	—	—	0.03	
E	Dial Painting	18	0.04	0.003	0.014	
	Weighing Table	1	—	—	0.35	
	Weigher's Pocket	1	—	—	0.13*	*This is a measure of the weigher's exposure.
	Supervisor's Pocket	1	—	—	0.04	
	Inspection and Packing	2	0.03	0.007	0.019	
	Washing Rejects	2	0.042	0.026	0.034	
	Dark Room	1	—	—	0.028	
F	Dial Painting	11	0.53	0.12	0.03	
	Screening	4	0.032	0.026	0.03	
	Dryer	1	—	—	0.01	
G	Dial Painting	5	0.033	0.003	0.025	
	Mixing	2	0.25	0.07	0.016	
	Packing	2	0.044	0.044	0.022	

into the air from non-impervious walls and ceilings which are adsorptive.

Painting operations should be located in large rooms and workers should not be crowded into a small area. This is important in order to prevent the radioactive material from being confined in a small room volume and result in a high radon content in the room air about this area. It is advisable in laying out the plant that about 500 cubic feet of room volume be allowed per worker in order that a large dilution factor be available for maintaining a low radon concentration. Rooms should have a high ratio of window area to floor area in order that good natural ventilation may be obtained. Care must be exercised to secure the intelligent use of window ventilation in order that sharp air currents may not move over painted work or tables and disperse paint dust or powder into the room air.

PERSONAL HYGIENE: The necessity for thorough personal hygiene, particularly as applied to hand washing cannot be over-emphasized. In our experience, this is the greatest problem facing dial painting plants today. The degree of required hand washing has probably been practiced by few individuals in any walk of life. Possibly the more extensive use of rubber finger guards should be employed. It is felt that the degree of washing, which is desirable, can be practiced. As was mentioned in discussing Table III, in one of our plants, women have been employed 16, 17 and 20 years respectively, without exceedingly high breath radon samples despite a history of pointing the brush in their mouths in their early painting days. One should not overlook the fact that, simply because a painter is extremely neat about herself and in her job, she necessarily takes the extreme precautions required in washing.

It goes without question that management must provide sufficient wash basins in order that the painters do not have to wait too long in line before washing. If facilities are insufficient—and the best way to determine this is not by number of basins but by asking the painters—the washing periods should be staggered among groups at the end of the day and at noon, and the schedule periodically rotated. In this way no painter will feel that she is always the last one to leave the plant.

The wash basins should be kept very clean; hot and cold water, soap and towels should be provided. Solvent, for removing the paint which may have contaminated the hands, should be available in suitable dispensers. Cotton pads should be provided in order that they may be wetted with solvent and aid in the removal of the paint. The hands should not be washed in the solvent because of the danger of dermatitis. Tabershaw, Morris, et al.[9] have recommended the use of a solvent for washing, consisting of one part of xylene, one part trichlorethylene and two parts of ethyl alcohol. Other mixtures can also be prepared.

A good washing procedure is to first wash off the paint, immediately followed by washing the hands with soap and water for at least five minutes, employing a nail brush and hand brush to thoroughly clean the hands. After this the hands can be dried. It is advisable to provide a hand lotion and/or cold cream in suitable dispensers for the girls to use after washing and even before work. Following washing, the girls should go into a dark room for hand inspection under an ultra-violet lamp. This lamp should be portable in order that the hair and face may also be thoroughly inspected. There are many ultra-violet lamps available. The General Electric 4-watt RP-12 lamp may be secured from the Grimes Mfg. Company, Urbana, Ohio, in a convenient holder. The Conti-Glow Division of the Continental Lithograph Company, Cleveland, Ohio, provides a lamp which can be made into a portable unit. In all lamps, all the visible light should be filtered out. Tabershaw, Morris, et al., have described a good portable unit using the G.E. 250-watt Purple-X lamp. This unit can also be used for room inspection. It may be advisable for plants to consider the granting of some type of prize each week or month for the girl securing the best hand cleaning record. No girl should be allowed to leave the room without first washing, because of the danger of her securing something to eat outside the room.

Girls should be carefully instructed in the proper washing technic at the time of employment. Girls who are found to have contaminated hands after washing should be sent back to repeat the washing schedule. It is also advisable that a separate dark room be provided for hand inspection. We have found that if the same dark room is employed that is used for inspecting dials, some girls will again contaminate their hands by touching a table, the walls, etc., before leaving the room.

It is advisable that painters not be allowed to wear jewelry, particularly with gems, for we have found radioactive material imbedded around the setting of the gem. It is also advisable that painters not have long fingernails of the "talon type" generally found among women, for it is difficult to remove paint from under these nails. However, it may be difficult to enforce this regulation among our present-day girls.

Workers should be provided with clean smocks preferably twice weekly, but at least once a week. These smocks should extend below the knees. Separate lockers should be provided for keeping the smocks separated from street clothes. Head coverings are desirable but, to be adequate, they should completely cover all the hair. It is, however, difficult to secure the co-operation of girls in this measure although many girls will wear "kerchiefs" which will provide partial covering of the hair.

HOUSEKEEPING: It should be obvious that cleanliness of the plant should be as important as personal cleanliness. Poor housekeeping will result in dust on tables, floors, and walls which can easily be dispersed into the air by air currents and by vibration produced simply by walking about or handling equipment. EXTREME PRECAUTION SHOULD BE EXERCISED TO PREVENT THE ACCUMULATION OF PAINTED STOCK IN THE ROOM EXCEPT IN VENTILATED CABINETS. There is a great tendency to do this and vigilance is required in its prevention. This not only increases the radon concentration but also the possibility of dust liberation.

The supply of radium luminous powder should be locked securely, and only supervisory personnel should be allowed to remove the material. The amount of radioactive powder supplied to a worker is of major significance, for upon this depends the degree and extent of control. First, all powder should be purchased in one-gram vials, and bulk supplies should not be used. Only one gram of material should be given to a painter at a time, and the work painted with this material should be removed before another gram is supplied. There are some types of work where this is not practical, as, for example, inclinometer backings, which require one gram of paint for each two to three backings. However, most of the work can be done under this schedule. Immediately after painting, all work should be placed in a mechanically-ventilated dryer. We have noticed, in some of the dryers in use, that there is no air inlet when the doors are closed.

Floors, painting tables, booths, and other tables should be cleaned daily always by wet methods. Dry brushing, sweeping or other cleaning operations should be prohibited. Ventilation ducts, and the building structure should be cleaned weekly. Cloths wetted in

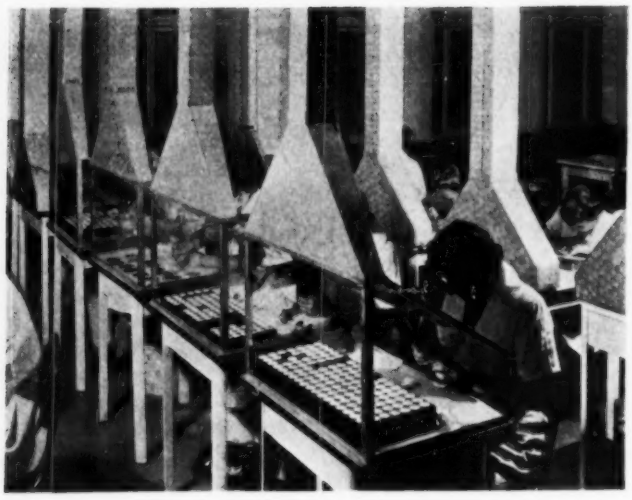


Fig. 4

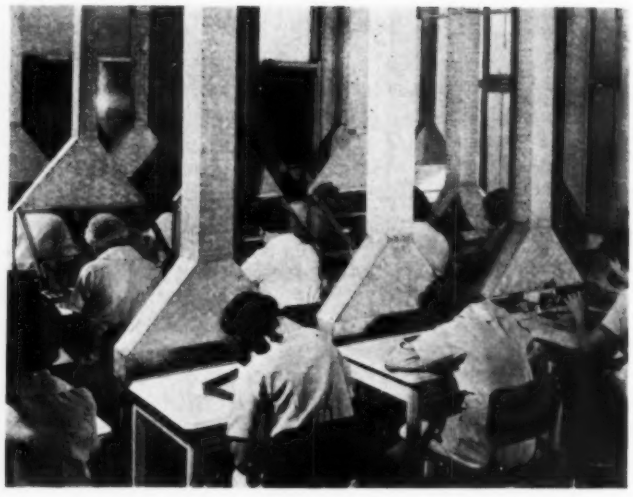


Fig. 6

solvent should be used in cleaning, but frequent changing of the cloth should be done because of the danger of dust being liberated from the dry areas when it becomes very dirty. Wet methods are preferable to vacuum methods, because of the danger existing in having a filter bag with radioactive dust in the room and in shaking out the bag. Hand protection against dermatitis is essential in cleaners, and can be provided by rubber gloves. The solvent used should be of low toxicity, and benzol, carbon tetrachloride, etc., should be prohibited. It has been suggested by others that a lead-type respirator be worn by the cleaners. If this is done, filter pads should be changed after each use and the respirator thoroughly washed in the same interval. It should also be checked under the ultra-violet lamp for cleanliness. It should be realized that, while the dust is filtered out, the radon passes through the filter and is inhaled by the cleaner. Cleaners should have periodic breath tests as frequently as experience reveals to be necessary.

It should be obvious that no personal belongings, such as handbags, should be brought into a radium room nor should any food of any type be allowed in the work rooms. A handbag may become contaminated and be a mode of transmitting paint or powder to clean hands after working hours. Blotters upon which dials are painted should be small and fixed in position, and girls should not point brushes on them. They should be changed at least daily.

We have found relatively large amounts of paint in ventilating ducts and fans, and in the corners of the common glass table booth. Regular inspection of work rooms is most essential with ultra-violet light after dark. This is a very excellent check on plant housekeeping.

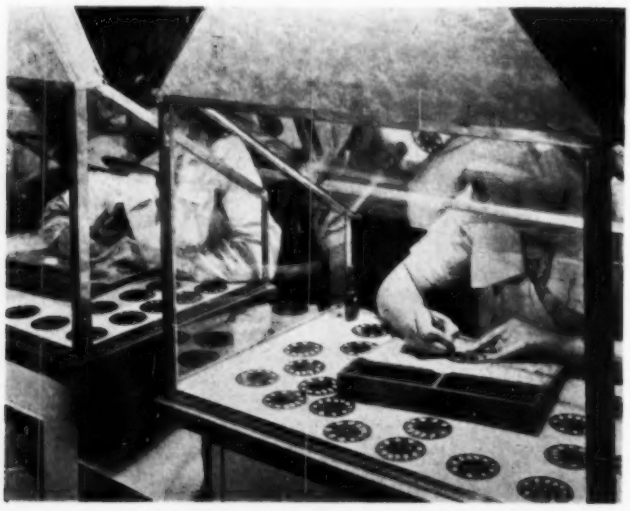


Fig. 5

It is important to call attention to the screening operation. Dry used screens should not be left in the room, but should be immediately cleaned in solvent or placed in a ventilated chamber until this can be done. These screens are important sources of room air dust in the handling of them and by air movements passing over them.

VENTILATION: There is good reason for providing general mechanical ventilation in dial painting rooms, and, when provided, it should be well distributed. However, table ventilation is a moot question which must await further study and universal agreement as to the safe radium and radon tolerances. Plant E in Table III has never had any table ventilation even though each painter mixes her paint. Several of these findings are very low, considering the years of experience. We are more prone to attribute the high results to the ingestion of paint from poor personal hygiene. More data of this type are necessary in evaluating the ventilation problem.

Girls do not like to work under the common type of glass booth (Figs. 4 and 5). Girls in several plants in this state have complained of fatigue and irritability since they have been painting, due to what they think is the confined area and the position in which they must work. State agencies have accepted too readily the glass-top booth with its ventilation rate as shown in the U. S. Bureau of Standards Handbook H27. However, this pamphlet states that other arrangements which will accomplish the same results are available. The criteria should be the room radon content and breath samples of the painters rather than any one ventilation design. The result is the important factor and there is always a variety of methods in achieving the result.

The ventilation rate generally recommended is 50 cubic feet per minute through the glass booth. Since the mouth of the booth, which is its smallest cross section is about one square foot, the maximum velocity through the booth is 50 feet per minute. Therefore, if ventilation is necessary for dust control, it seems that this velocity would be too low for causing a movement of the dust particles to the hood throat. Furthermore, it is felt that the transport velocity in the ducts would be too low to prevent settling.

Study given to the ventilating problem in one plant led us to the design of the hood shown in Fig. 6. This

lateral exhaust hood is a 4-inch slot extending along the far edge of the table. The ventilation rate has been designed for 100 cubic feet per minute. This design has given the girls more freedom of movement over their table and has produced better work and a higher production rate. Breath samples taken on these girls were lowest of all the plants studied.

There is no question but that local exhaust ventilation is necessary for some jobs such as carding and screening. However, ventilation for mixing is again controversial. Mixing of small amounts (1 gram) can be done safely if the mixer has the material in a vial and is very careful not to dump the material into the crucible by inverting the vial quickly, vigorously tapping or shaking the vial and mixing the paint vigorously. The powder should be removed carefully allowing it to run out of the vial slowly with the vial held at an angle. Rolling the vial between the thumb, index and middle finger while in this position will easily remove the powder which may otherwise adhere to the sides of the vial. The proof that mixing can be done safely without local ventilation can be attested to by the breath samples of girls who have done it for some years. Of course great caution is necessary and only small amounts should be mixed at one time. Today, however, with the rapid rise of dial painting and the difficulties in securing the best type of painters and consequently careful mixing, it may be advisable to provide ventilation for mixing. If mixing is done by each painter, table ventilation is desirable. We are, nevertheless, of the opinion that the glass booth is not indicated and further that it impedes the thorough cleaning of the table. Ventilation of the lateral exhaust slot type extending along the far side of the table is, in our opinion, a preferable design. However, an even better design can and probably will be developed by others.

It may be well to consider the provision of several ventilated tables for mixing. Each painter could go to these to mix her paint and then return to her table. This would break the monotony of remaining at one station, and table ventilation would not be indicated for the actual painting.

Table ventilation does appear to be necessary when central mixing is practiced. When this is performed, several girls should be rotated in the mixing job, and the glass type booth is indicated. However, a ventilation rate of 100 cubic feet per minute would appear to be desirable. We do not feel that a respirator is indicated, for mixing.

Screening operations require local mechanical ventilation. The ventilation rate should be a minimum of 75 to 80 cubic feet per minute for each 5 grams of 38 M paint until more experience is gained on this work by those engaged in its study. The hood design can be of several types and the index of control should be the breath and room air radon samples. The plant doing screening in this state, at the time of this study, used 10 grams of paint at a time. The ventilation was provided by a canopy hood about 18 inches above the screen. The hood area was about 1.5 square feet with a face velocity varying, between hoods, from 230-350 feet per minute. The ventilation rate varied from 335-510 cubic feet per minute or 67-102 cubic feet per minute for each 5 grams of paint. A room air sample revealed 1.49×10^{-11} curies of radon per liter of air. This is not excessive to an alarming degree, and due, in part, to an accumulation of painted material on the table. This hood design can easily be improved by providing for the movement of all exhaust air over the screening operation by means of a lateral exhaust hood. In screening, there is a very great tendency to allow a very great accumulation of painted work. This is due to the high production rate of this method. However, the same vigilance is necessary here as in hand painting, for the immediate removal of painted work to a ventilated dryer.

Carding operations should be provided with ventilation because of the opportunity of dust emanation from the wiping cloths and from the dial itself. However, it is also of great importance in this work that clean cloths be used for each dial. The ventilation requirements for this work should be of the types discussed previously in this paper. However, it would be difficut to conduct this work in the glass booth table, and it is felt that the 4-inch lateral slot, previously discussed, with a minimum ventilation rate of 100 cubic feet per minute, would provide adequate protection. Breath tests on two girls who have done this work for six months at this type of ventilated table did not show a breath radon content in excess of 0.52×10^{-12}, or 52% of tolerance. This is not intended as proof of the safety with which the work can be done, but to indicate that, as yet, the exposure in this plant does not appear to be excessive. The room air radon content about these girls was 1.89×10^{-11}.

Ventilation should be provided for all dryers and storage cabinets. Hemeon and Evans have recommended 360 cubic feet per minute per 1000 dials. However, since the amount of paint varies in the many types of dials, their rate of 50 cfm. per 5 grams of paint may be more easily used to determine the required rate for the cabinet or dryer.

SELECTION, SUPERVISION AND INSTRUCTION: The selection, supervision and instruction of employees is a very important measure for the safe conduct of radium luminous painting operations.

The selection of the workers should be directed toward the securing of girls who are in good health, practice good personal hygiene, are neat, and are free from habits such as nail biting, and wiping the corners of the mouth with their hands. Of course this will be difficult since it depends on subjective findings at the time of the interview. In addition, with the high labor turnover in the industry, there will be a great tendency to relax requirements in order to meet production schedules.

Girls cannot be expected to perform the work safely unless they are shown how to conduct the work, how to clean up their tables and how to wash their hands. Great care should be taken to show painters how to mix paint as discussed in this paper, and why certain precautions are necessary. This should not be cursory but done very carefully and slowly. All workers should be told of the hazards involved in the industry and the measures afforded for their protection. We have found that, in doing this, we have been able to allay the great fear that girls have of working with radium luminous paint even in plants of the most modern type.

All regulations should be posted in the plant in a most conspicuous manner as a reminder to the girls of their obligations not only to the plant, but also, and more important, to their own well being. Supervisory personnel should be constantly on the lookout for girls whose work habits are sloven, whose personal hygiene is poor and who have tendencies such as nail biting. No food of any type or personal belongings such as hand bags, should be allowed in rooms containing radium. Supervisors should rigidly enforce this regulation. Workers who cannot correct these poor habits should be dismissed from the work for their own safety.

MEDICAL CONTROL: Medical control in dial painting plants is limited. The protection of the health of the workers depends largely upon the physicist. However,

the plant physician can materially assist in this program by insuring the employment of healthy workers in so far as possible. The following precautions should be practiced:

1. Accept only those in good physical condition.
2. Deny placement to workers with a previous history of anemia.
3. Deny employment to girls with an abnormal menstrual history.
4. Deny placing girls with any disease of the skeletal system.
5. Good dental and oral hygiene should be insisted upon and encouraged.
6. No pregnant women in any period of gestation should be employed.
7. Girls who are normally untidy and lack personal care and hygiene should be avoided.
8. No worker under 18 should be employed because of skeletal development.

Several plants are employing blood counts as an aid in determining excessive exposure of workers to radiation. Routine blood counts are an excellent procedure for supplying information on the general health level of all persons, however, they are said by American authorities to be of no value in determining excessive exposure to radium in dial painting. Martland sums up the question of blood counts by the following comment:

"Radium poisoning can not be diagnosed from an examination of the blood. Most of the profound anemias develop only in the terminal stages of the disease. An individual may show considerably radioactivity and still have a normal blood picture because of the stimulative effect of the alpha bombardment which accompanies the irritative and destructive effects in the earlier stages. Hence, periodic blood examinations of workers are of little value. It is more important to know if a worker is radioactive and how much radium is deposited in the body."

However, a different effect has been noted in England.[3] Dr. Ethel Browning has found that a considerable percentage of young people engaged in luminizing (dial painting) exhibit a lymphocytosis which is an increase in one type of white cells. It was found that this may occur after being at work only a few months. We believe, therefore, that differential white cell counts should be done until this aspect is clarified.

The question will naturally arise as to what procedure to follow with those workers revealing breath radon samples exceeding 100% of tolerance. First, we believe the breath sample should be repeated two weeks later. If the test is still high, individuals should be placed in work away from all radium paint until such time as their breath samples are within the 100% tolerance value. This period is generally one to two weeks. It is also generally recommended that these individuals be asked to refrain from calcium foods during this interval as much as possible. Such foods as milk, ice cream, white bread, cream, cheese and eggs should be discontinued. This is done to aid in the elimination of the radium in the body.

It may be desirable to provide a week of vacation every six months after which a breath sample should be obtained.

The decalcification method of eliminating recently deposited radium has been studied by Aub, Evans and their co-workers.[10] Plant physicians should become familiar with this work. It is suggested that such therapy may be of value before the appearance of clinical symptoms, for, at this time, the trabeculae (bony mesh-work of the bone) contains about 11 times more radium than the cortex (outer layer of bone), and while in the former part of the bone the radium can be eliminated. Once fixed in the cortex, it remains there permanently.

There is some evidence to show that a high calcium diet is desirable for radium workers because a much larger per cent of the ingested radium will be permanently fixed in the skeleton of workers with low calcium diets than those on high calcium diets. While this may be true, the fact remains that, when such information is advanced, there is a tendency to emphasize this phase at the expense of the physical control of the environment. This has been seen time and time again in the lead industries. NOTHING CAN SUPPLANT THE NECESSITY FOR PHYSICAL CONTROL OF THE WORKING ENVIRONMENT.

ROUTINE TESTS: One of the most important measures for the safe conduct of radium dial painting operations is periodic tests of the workers and plant environment. These tests consist of the breath samples for radon analyses of all people working in the plant, whether or not they paint, and analyses of the room air for radon.

All dial painters should have their breath tested at least every six months, and screen operators, mixers, carders, dry weighers, and cleaners every three to four months. The testing interval, however, can best be determined after several initial tests. These tests should best be taken after the week-end, on Monday morning, before work, and at some location away from any room containing radium, preferably in another building. In no case should these tests be taken sooner than 12 hours after leaving the plant.

Room air samples should be taken at least every six months. These should be obtained from the general room air and in certain localized areas such as weighing, mixing, screening and carding.

These tests must be taken and interpreted by a trained physicist or other individual with special knowledge of the industry and the procedures used for testing. There is a dearth of such individuals and of laboratories with satisfactory analytical facilities for determining the radon in air samples. At present, there are only two laboratories, both in the East, which can analyze the breath and room air samples. There is a charge at present of about $14.00 per sample. We in the Illinois State Department of Public Health are assisting the radium dial painting plants in Illinois in developing a program with these laboratories for these essential radon tests.

It is best not to keep the flasks used to obtain the air samples, in radium painting rooms because of the danger of contamination. Great care should be employed in their handling for this same reason.

Routine Geiger-Müller tests on workers would be desirable as a check on body and clothing contamination. However, due to the fact that this instrument is not generally available, and it requires for its operation a physicist or other individual skilled in its use, reliance will best be placed upon daily inspection under ultra-violet light.

Conclusions

THIS paper has revealed the results of our experience with radium luminous dial painting in Illinois gained from observation and gamma ray, room air and breath radon samples in which samples we cooperated with the U. S. Public Health Service. We have concluded from these findings that:

1. The most meticulous housekeeping and personal hygiene appear to be the greatest factors for the safety of painters.
2. The commonly suggested table top ventilated glass booth does not appear to be indicated for painting per se.
3. Local exhaust ventilation where required at

tables is adequate if applied by a 4-inch slot extending along the far edge of the table. Painters can work more easily when free of the glass booth.

4. There is a great need of re-examining accepted tolerance values in view of controversial opinions of physicists both here and in England.

5. Wet screening operations can be safely conducted by adequate localized mechanical ventilation, excellent housekeeping, and personal hygiene.

6. The weighing of radium luminous powder should be discontinued and the powder purchased in one-gram vials.

7. Great care is required to preclude the accumulation of painted materials at the painting tables or in unventilated areas. All painted work should be immediately placed in mechanically ventilated dryers.

8. Paint should be provided to the painters one gram at a time in so far as practical. The work done with this paint should be removed to a dryer before more paint is issued.

9. Nail biters should be prohibited employment or dismissed from work if the practice is continued.

10. The over-exposure to gamma rays is remote, although periodic measurements should be taken.

11. Adequate hand washing is a difficult problem which requires meticulous application to a definite washing procedure.

12. Findings in this state reveal that workers have worked in a dial painting plant without table ventilation for 15 to 17 years, and now reveal breath samples not in excess of 200% of the 10^{-12} tolerance. These workers gave histories of pointing brushes in their mouths in the early days. Based upon these and other findings, it is felt that the ingestion of radium, chiefly from contaminated hands, is the greatest problem in the modern plant.

13. Routine room air samples for radon analyses should be taken every six months. Breath samples should be obtained every three to six months, depending upon the exposure. All personnel should be included in these tests.

14. Dry scraping of paint should be discontinued if possible, otherwise this work should be done in mechanically ventilated enclosures.

15. Dry cleaning operations should be prohibited at all times.

16. Individuals accumulating more than the tolerance amount of radium should be removed from the radium room to another job or given a paid vacation.

17. It may be desirable to grant paid vacations every six months.

18. Blood tests including hemoglobin, red and white counts, as well as a differential count should be done every six months. The values of these tests in radium poisoning are in themselves not diagnostic. However, as a measure of the general health level of the worker, these indices are of value.

19. Radium luminous dial painting can be conducted safely without excessive monetary costs for control measures.

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Carbon Tetrachloride

—Part 2 of a Literature Study of Reports of Occupational Injuries Attributed to Volatile Solvents—

H. P. QUADLAND,
Safety Research Institute,
New York

AS STATED in the article introducing this literature study (INDUSTRIAL MEDICINE, November, 1943, p. 734), the study is limited to American cases of occupational injuries, reported in the medical literature during the last 10 years as having resulted from inhalation of certain organic solvents.

It was found impossible, however, to keep the carbon tetrachloride study within these limits, because the uses for the product are not merely occupational. Therefore, all instances representing applications comparable to those in industry have been included.

Certain reports, not included in the table, which have appeared in the literature should perhaps be mentioned.

Eight experiments, using various concentrations of carbon tetrachloride over varying periods of time, were arranged by Davis (*J.A.M.A.*, September 29, 1934) in an effort to determine the effects of the vapors on human beings.

Smyth, Smyth, Jr., and Carpenter (*J. Indust. Hyg. & Tox.*, May, 1936) in their study of carbon tetrachloride toxicity, examined 96 men exposed to the solvent in various processes in industry. They stated that "tests showed none who could be considered seriously or even unmistakably injured by the solvent vapors." In a subsequent report (*J.A.M.A.*, November 21, 1936), Smyth and Smyth, Jr., stated, that "none of the deviations from normal (in the 96 men) were marked."

Elkins and Hemeon (Bul. 5503, Mass. Dept. of Labor and Industries, November, 1938) reported on a chemical and engineering survey of 15 plants employing a total of 46 workers in the fur cleaning industry, stating that the study was undertaken as the result of "an alleged case of carbon tetrachloride poisoning." No other information about the case is given. It is also stated that, after completion of the study, "compensation claims have been filed for two other workers," but no details are given.

Hamilton (*Yale J. Biol. & Med.*, July, 1943) refers to two cases reported to her by McBirney, but, other than mentioning their symptoms and the fact that they recovered, gives no details.

Fire Extinguisher Cases

AS THE literature on carbon tetrachloride generally refers to fire extinguisher cases, they have been included in this study. Because only two cases which occurred in this country during the period represented by the study could be located, a search of the medical literature published since 1919 was made. References appearing in the American literature, when traced to their original source, have proved to be one of the cases cited in the table (usually the case which occurred in 1919) or one of the foreign cases.

One case, mentioned by Perry (*Army M. Bul.*, October, 1942), "the experience of the Detroit Fire Department in 1938 when six firemen lost their lives as the result of demonstrating these extinguishers," was apparent incorrectly attributed to carbon tetrachloride extinguishers. The Detroit Fire Department has no record of such an instance.

The study of benzol (benzene) cases reported in the American medical literature was Part 1 of this series, in the November issue. The studies on carbon disulphide, trichlorethylene and petroleum solvents will follow in successive issues.

AMERICAN CASES OF OCCUPATIONAL EXPOSURE TO CARBON TETRACHLORIDE IN THE MEDICAL LITERATURE SINCE 1932

Year	Circumstances	Chemical	Degree of Exposure	Length of Exposure	Ventilation	Early Symptoms
*1931	Schoolhouse janitor waxed large cafeteria floor in semi-basement	45% CCl_4 52% turpentine as solvent for liquid wax	Used approx. 12 qts. wax	2½ days (?)	"Windows and doors were kept closed"	Pains in joints and muscles, gastrointestinal irritation, hoarseness
1932	5 men removing leaking containers of CCl_4 stored in small compartment of ship	CCl_4	Not stated	Brief	Small, poorly ventilated compartment on ship	Weakness, nausea, fainting
1932	Laborer, 54, cleaning old telephones	60% CCl_4 40% gasoline	Not stated "....fumes arising from the cleaning solution were unmistakable"	6 months	"Poorly ventilated" room	Large abdomen, headache, nausea
1932	7 laborers cleaning felt by passing it through vats "while the fluid was still warm"	33% CCl_4	Not stated	"Few days"	Not stated	Nausea, vomiting in 3 cases; headache in 5 cases; diarrhea in 6 cases
1932	2 workers "in a shallow pit cleaning up grease about a motor"	60% CCl_4 40% naphtha	"Fumes" reported "strong"	1 day	Not stated	Smarting and burning of eyes, vomiting, abdominal pain
1932	Worker, cleaning floor of varnish room	CCl_4	Not stated	Not stated	"Floor of the room was warm and the ventilation poor"	"Feeling sick"
1933	Male, 20, working in dry cleaning establishment	CCl_4	Not stated	5 weeks	Not stated	Severe frontal headache, vertigo, tinnitus, nausea, vomiting, spots before eyes
1933	Male, 43, working in dry cleaning establishment	CCl_4	Not stated	10 weeks	Not stated	Nausea, dizziness, headache, weakness, blurred vision, eyes irritated
1933	Male, 30, working in dry cleaning establishment	CCl_4	Not stated	4 weeks	Not stated	Severe diarrhea, abdominal pain, nausea, vomiting, loss of weight
1933	Male, 48, working in dry cleaning establishment	CCl_4	Not stated	6 months	Not stated	Dizziness, headache, nausea, vomiting, dimness of vision, black spots before eyes
1933	Male, 44, working in dry cleaning establishment	CCl_4	Not stated	6 weeks	Not stated	Nausea, headache
*1933	Laborer, 46, cleaning clothes in open receptacle	55% CCl_4 45% naphtha and benzine	Not stated	11 years	"Small, poorly ventilated room"	Nausea, vomiting
*1933	Laborer, 30, cleaning condensers on ship	CCl_4	Not stated	2 hours	"Small space," apparently no ventilation	Headache, nausea, vomiting, abdominal cramps
*1933	Street cleaner, 49, cleaning stencils	CCl_4 plus other cleaning solvent, not named	Not stated	10 days	"Rather close quarters indoors"	Headache, diarrhea, nausea, vomiting, cyanosis, nosebleed
1934	8 men spraying cellulose cement on liner rolls	CCl_4	370 p.p.m.	Daily (?)	Not stated	Nausea, headache, vomiting
1934	Man working on traveling crane in low ceiling building	CCl_4 and benzene	Not stated; mixture was being used over heated mandrils	Not stated	Not stated	Nausea, vomiting
*1934	Male, 36, cleaning rug	CCl_4	Not stated. Used 1 gallon of CCl_4	3 hours	Not stated	Vomiting, headache, weakness, liver tenderness, albuminuria, hematuria, slight swelling of ankles, hiccoughs
*1934	Workers in dry cleaning plant 1) Floorlady, 42 2) Male cleaner, 29 3) Male cleaner, 29	CCl_4	Not stated	Not stated	"Distinctly troublesome and temperamental ventilating system"	1) Nausea, vomiting, loss of weight, irritability, anorexia, insomnia 2) Weakness, nausea, anorexia, insomnia 3) Same as 1) and 2)

*Indicates year of occurrence; otherwise year reported.

AMERICAN CASES OF OCCUPATIONAL EXPOSURE TO CARBON TETRACHLORIDE IN THE MEDICAL LITERATURE SINCE 1932

Later Symptoms	Length of Illness	Consequences	Reported by	Remarks
Bladder disturbance ending in nephritis, uremia, pneumonia	15 days	Died	HAYHURST, E. R., "Proc. 8th Internat. Congr. for 'Accident Medicine' & Industrial Diseases," Leipzig, 1938	2 other janitors had some of same symptoms on similar exposure
None	Several hours	No other consequences	HAIGLER, F. H., U. S. Naval Med. Bul., Jan., 1932, pp. 137-9	
Diarrhea, signs of cirrhosis of liver, loss of libido, cough	Back to work in 1 month, though under care for 4 months	Recovery	BUTSCH, W., *J.A.M.A.*, Aug. 27, 1932, p. 728	Other men engaged at this work developed symptoms, and asked to be transferred from time to time
Jaundice, liver enlargement in 2 cases; kidney irritation in 4 cases; 1 case acute nephritis with uremia, bronchopneumonia	Up to 2 months for 6 workers; approx. 4 months for man with bronchopneumonia	All recovered	McGUIRE, L. W., *J.A.M.A.*, Sept. 17, 1932, p. 988	Illness occurred after changing method, and "instead of using it to remove the individual spot, a large amount, about a 33⅓% mixture of CCl_4, was placed in the vats"
None	One man out of work 3 days; other, 1 day	No further consequences	SHIRLEY, J. N., Rubber Age, Dec. 10, 1932, p. 166	
Bronchial pneumonia	Not stated	Died	SHIRLEY, J. N., Rubber Age, Dec. 10, 1932, p. 167	Author states about cause of death: "I do not believe this was the result of carbon tetrachloride fumes but might have been the result of broken down fumes: phosgene, chlorine, etc."
Lethargy, slight icterus	Not stated	Recovered	WIRTSCHAFTER, ZOLTON T., Am. J. Pub. Health, 23, 1933, p. 1035	
Polyuria, constipation, lethargy, congested conjunctivae, marked epiphora	Not stated	Recovered	WIRTSCHAFTER, ZOLTON T., Am. J. Pub. Health, 23, 1933, p. 1036	
Muscular weakness, lassitude, irritability, congested conjunctivae	Not stated	Recovered	WIRTSCHAFTER, ZOLTON T., Am. J. Pub. Health, 23, 1933, p. 1036	
Same as early symptoms	Not stated	Recovered	WIRTSCHAFTER, ZOLTON T., Am. J. Pub. Health, 23, 1933, p. 1036	
Vomiting, cramps, diarrhea, insomnia, loss of sexual libido, loss of weight, conjunctivae congested, slight epiphora	Not stated	Recovered	WIRTSCHAFTER, ZOLTON T., Am. J. Pub. Health, 23, 1933, p. 1036	
Swelling of abdomen, abdominal pains, cirrhosis of liver, slight anemia, occasional epistaxis	Discharged from hospital in 25 days; contrary to medical advice, he returned to same exposure; was readmitted to hospital after several weeks; underwent operation	Died	POINDEXTER, CHARLES, and GREENE, CARL: *J.A.M.A.*, June 16, 1934, pp. 2015-7	Other men had attempted to work with him, but could not continue because "they soon became ill"
Liver tenderness, nephrosis	19 days	Recovery	FRANCO, S., N.Y.M.J., Dec. 1, 1936, p. 1848	
Mild sacral edema, acute nephritis	22 days	Recovery	FRANCO, S., N.Y.M.J., Dec. 1, 1936, p. 1848	"Drank heavily." Several other men with whom he worked apparently unaffected
None	Apparently no time lost	No other consequences	DAVIS, P. A., *J.A.M.A.*, Sept. 29, 1934, p. 963	No further trouble after spraying was done under suction hood with suction floor grating
None	No time lost, apparently	No further consequences	DAVIS, P. A., *J.A.M.A.*, Sept. 29, 1934, p. 964	"Proper ventilation and reduction of the amount of CCl_4 used" remedied situation
Edema of lungs, nephritis, myocarditis and, from symptoms, fatty degeneration of liver	Discharged from hospital after 10 days	See remarks	McNALLY, W. P., "Toxicology," 1937, pp. 694-5	Author states: "He was very nervous and continued to have trouble with his heart, and a year and a half after the accident he committed suicide. An autopsy was not possible, as he lived in another city"
1) None	Apparently no time lost	All recovered	NELSON, ROBERT L., Minnesota M., June 1934, p. 344	1) "Climacteric phenomena at first suspected"; returned to same exposure after medication, but suffered only mild repetition of symptoms
	1) 1 month prior to visit to doctor			
2) None	2) 2 months prior to visit to doctor			2) Returned to same exposure after medication, but to date of report (5 weeks later) no recurrence of symptoms
3) None	3) 1 year prior to visit to doctor			3) Returned to same exposure after medication, but suffered only mild recurrence of symptoms

AMERICAN CASES OF OCCUPATIONAL EXPOSURE TO CARBON TETRACHLORIDE IN THE MEDICAL LITERATURE SINCE 1932

Year	Circumstances	Chemical	Degree of Exposure	Length of Exposure	Ventilation	Early Symptoms
*1935	Flour miller, 51, overweight, fumigated parts of flour mill; had to descend into one bin 30 feet square and 40 feet deep	40% ethylene dichloride 40% propylene dichloride 20% CCl_4	Used 3-4 gallons of fumigant; unknown portion in the one bin	1¼ hours in all; 15 minutes in the one bin	Only attic window open	Heart action weak, pronounced pallor, shortness of breath
*1935	Railroad janitor, 67, cleaning his garments in basement	CCl_4	Used 3½ gallons in room 16x25 feet x 12.5 feet high; 80-90° F. temperature	½ hour	No windows, self-closing door, small 8″ sq. vent near ceiling	See consequences
*1935	Mechanic and electrician cleaned electric motor	CCl_4	Used 2-4 quarts	4 hours	Not stated; "large building"	Severe headache, "vomiting approaching convulsions," irritated eyes, sleepiness, mental sluggishness, high temperature, high blood pressure, chills
*1935	Embalmer, 42, carrying out "extensive fumigation"	CCl_4	Not stated; walls, floors and baseboards sprayed with the liquid	2 hours	"Small room with the doors and windows closed"	Abdominal cramps, fatigue, nausea and vomiting
*1936	3 students, cleaning ink pad of printing press	CCl_4	Not stated; fluid "freely used"	About 3 months	Basement room	Vague epigastric pain, anorexia, nausea, cough, malaise, weakness
1936	Housemaid, 40, cleaning clothes	60% CCl_4 40% dichloropropane	Not stated; used almost 1 gallon of fluid in a basin, dipping garments in the liquid	Not stated (apparently short interval on 2 occasions a few days apart)	Small room	Dizziness, fainting, collapse, at time of first exposure
*1936	Cable-splicer, 47, working in manhole cleaning insulators	⅖ CCl_4 ⅗ gasoline	Not stated	4½ hours	Apparently entirely lacking	Headache, dizziness, nausea, vomiting
*1937	Negro housemaid, 37, cleaning dresses	CCl_4	Not stated	3 hours	"Close, stuffy room"	Vomiting, diarrhea, chills, fever
*1937	Negro dry cleaner, 35, cleaning furniture and draperies	CCl_4 (had previously been using mixture of perchlorethylene and trichlorethylene or CCl_4)	Not stated; apparently used several gallons	Several hours	Not stated	Headache, dizziness, vomiting, malaise
1938	Russian worker, 24, dry cleaning	CCl_4	Not stated, "large amounts . . . every ten minutes of the day"	4 months	Not stated	Nausea, dull ache in kidneys, abdominal ache, lassitude
1939	Man, 56, painting inside of vat with asphalt paint	50% CCl_4	Author states "Concentration in vat must have been great"; workers "instructed to aid one another in case of illness due to fumes"	1 day	Not stated, apparently none	Nausea, vomiting, anuria
*1940	Foreman, 47, in refrigerator factory	CCl_4	Estimated at 600 p.p.m. when refrigerators were cleaned	15 years, "constantly exposed"	None "other than a ventilator which was used only sporadically and was of questionable efficiency"	Diarrhea, abdominal pain
*1940	Fur factory worker, 31	CCl_4	Author states concentration in air "actually breathed as he stood over the furs must have been very high"	"Less than 4 hours"	"The workroom was large, but had no special ventilation system"	Nausea, vomiting, epigastric pain, delirium
*1940	Negro male, 38, cleaning felt bags which had contained lead dust (by immersing bags in large vat of cleaning solution)	25% CCl_4 75% ethylene dichloride	Not stated	7½ hours	Not stated	Nausea, vomiting, headache, bubbling in ears, haze over eyes, blisters on hands, dry throat
1940	6 men degreasing in mechanical repair department of newspaper	50% CCl_4 50% naphtha	Not stated	Not stated	24″ fan located near ceiling	Digestive complaints, nausea, some vomited, dizziness
1941	100 carpenters and joiners tailoring and cementing slabs of insulating cork against metal walls of ship bulkheads, magazines and refrigerator rooms	24% CCl_4 in cement	Each used 5 gallons cement per day	Not stated	20-40 feet below deck; blowers stirred up and diluted vapors but did not vent them	Nausea, vomiting, sore lungs, headache, dizziness, sore eyes, sore throat, troubled dreams, some jaundiced, 1 man unconscious once
1941	Worker and employer; container of CCl_4 dropped on basement floor	CCl_4	Not stated	Brief	"Small, dank basement"	Unconsciousness
1941	Night janitor in movie theatre, 45, cleaning carpet in restroom, worked on hands and knees over bucket of cleaning fluid	"Very light naphtha containing CCl_4"	Not stated	Several hours	"Only a small opening in the ceiling for ventilation"	Dizziness, severe headache, nausea, vomiting, feverish and chilly, eyelids, hands and feet swollen and stiff

*Indicates year of occurrence; otherwise year reported.

AMERICAN CASES OF OCCUPATIONAL EXPOSURE TO CARBON TETRACHLORIDE IN THE MEDICAL LITERATURE SINCE 1932

Later Symptoms	Length of Illness	Consequences	Reported by	Remarks
Severe cardiac attack	2 months (had continued working at intervals during this period)	Died	HAYHURST, E. R., "Proc. 8th Internat. Congr. for 'Accident Medicine' & Industrial Diseases," Leipzig, 1938, pp. 1180-2	Another workman who did not descend into bin only slightly affected; author mentions age and arteries as predisposing possibilities
Autopsy showed slight coronary sclerosis, low-grade arteriosclerosis of spleen and kidneys, slight fatty infiltration of liver	None	Found dead	HAYHURST, E. R., "Proc. 8th Internat. Congr. for 'Accident Medicine' and Industrial Diseases," Leipzig, 1938, pp. 1180-2	
Unconsciousness, "left-sided hemiplegia," hemorrhage over left side of brain	3 weeks	Died day after he returned to work (3 weeks after exposure)	HAYHURST, E. R., "Proc. 8th Internat. Congr. for 'Accident Medicine' and Industrial Diseases," Leipzig, 1938, pp. 1180-2	
Acute nephritis and uremia	About 6 weeks (?)	"Uninterrupted recovery"	YOUNG, CECIL, Canad. M. Ass. J. Oct., 1936, pp. 419-21	
None	1 spent 2 days in hospital, all symptoms disappearing in 3 weeks; 2 others stayed away from work for 1 week	Recovery	CALDEMEYER, E.S., J. Missouri M. Ass., Oct., 1936, pp. 387-8	Ventilation system was installed, after which all went to work again "with no untoward symptoms resulting"
Necropsy showed chronic diffuse nephritis, pial edema	See remarks	Died during second exposure	GONZALES, T. A., *J.A.M.A.*, Jan. 25, 1936, p. 286	Was revived by a physician the first time; report does not indicate whether illness continued
Anuria, precordial distress, nephritis, cyanosis, dyspnea	72 days	Recovery	DAVIS, G. G., and HANELIN, H. A., Indust. M., Jan., 1937, pp. 24-5	4 other men working with victim affected by dizziness and headache
Toxic hepatitis, toxic myocarditis, cirrhosis of liver (?), lobular pneumonia	Hospitalized 46 days	Recovery	SMETANA, H., Arch. Int. M., 63, 1939, pp. 764-6	". . . history of chronic alcoholism . . ."
Dyspnea, necrosis of liver, nephrosis, pulmonary edema, hemorrhages	9 days (?)	Died	SMETANA, H., Arch. Int. M., 63, 1939, pp. 766-8	Victim an alcoholic; a teetotaling co-worker, with identical exposure, experienced headache and gastrointestinal distress, which disappeared quickly upon reaching fresh air
Extreme lethargy	7 weeks	Apparently "uneventful recovery"	MADDING, G. F., and BUTT, H. R., Staff Proc. Mayo Clinic, June 22, 1938, pp. 391-2	Had been employed for 5 years, "exposed constantly to small quantities . . . without apparent untoward effect"
Nephritis, with clinical evidence of liver damage	Hospitalized 18 days	Recovery; died in 10 months from unrelated cause and autopsy indicated "no pathological changes remained in liver and kidneys"	SIMON, M. A., Canad. M. Ass., Dec., 1939, pp. 580-3	Other men working on same job apparently unaffected
Liver trouble, edema	38 days	Recovery	HAMMES, E. M., Jr., J. Indust. Hyg. and Tox., Mar., 1941, pp. 112-3	Patient drank "a couple of whiskies" and an occasional beer daily; fellow workers had no symptoms
Jaundice of skin, enlarged liver, persisting nausea	Hospitalized 3 times, for 47 days total	Recovery	HAMMES, E. M., Jr., J. Indust. Hyg. and Tox., Mar., 1941, pp. 112-3	Patient had used trichlorethylene for 3 years prior to this use of CCl_4
Severe headache, very dry throat	23 days	Recovered	JOHNSTONE, RUTHERFORD T., "Occupational Diseases," pp. 106-7	
None	Not stated	None	TRUMPER, MAX., Indust. Med., April, 1941, p. 152	No complaint after fan was installed at workbench ½ above work level and ⅔ below
None	Not stated (no time lost apparently)	None	TRUMPER, MAX, Indust. Med., April, 1941, p. 153	No further complaints after 90% CCl_4 was replaced with naphtha; "the latter being lighter was much easier to ventilate"
None	Apparently brief	Recovery	JOHNSTONE, R T., "Occupational Diseases," p. 104	
Anuria, burning on urination, oliguria, blurred vision, subconjunctival hemorrhages, acute toxic nephritis, hepatitis	35 days to hospital discharge; disability compensation for 8 months	Recovery	JOHNSTONE, RUTHERFORD T., "Occupational Diseases," pp. 108-11	

AMERICAN CASES OF OCCUPATIONAL EXPOSURE TO CARBON TETRACHLORIDE IN THE MEDICAL LITERATURE SINCE 1932

Year	Circumstances	Chemical	Degree of Exposure	Length of Exposure	Ventilation	Early Symptoms
1941	6 men employed in film coating room of motion picture plant	85% CCl_4 15% ethyl alcohol. Also, added fresh CCl_4 occasionally	79 p.p.m. (average)	Various periods, up to 7 years	Exhaust ventilation, but doors of drying cabinets not tightly closed	Nausea, vomiting, fatigue, gastric irritation; 1 had enlarged liver
*1941	88 soldiers cleaning rifles with cleaning compound	87.5% CCl_4	Not stated; mixture "spilled freely over the cement floor;" apparently fumes given off "for at least a week afterward"	Cleaning done one evening, but many of the men apparently used the room for sleeping and as "day room"	Concentration "sufficient to cause coughing in all personnel exposed, and windows were opened, although weather was cold and black-out provisions were in force"	Cephalalgia, anorexia, malaise, cough, slight dizziness, stupor
1942	Man, 26, applying paint remover in reconditioning elevators in buildings	CCl_4, chloroform and higher chlorinations of ethane, propane, butane and pentane	Not stated	1 year	No ventilation	Loss of weight, severe abdominal pain, vomiting
1942	9 men working in commutator department of factory	CCl_4 and naphtha	Not known during first inspection; second inspection week later showed 30 p.p.m. average	Varied from 7 months to 4 years	Recirculated air, tending to build up vapors, according to report	Nausea, loss of appetite, abdominal discomfort
*1942	Man, 44, working in elevator shaft, cleaning machinery	CCl_4	Not stated	Approximately 4 hours	Not stated	Nausea, vomiting, anuria
1942	"Workers in a plant"	CCl_4 and methyl ethyl ketone	10 to 30 p.p.m. (25 av.)	Not stated	Not stated; "used in a semi-enclosed process"	Stomach upsets
1942	Workers in a dry cleaning plant	CCl_4	15 to 60 p.p.m. (25 av.)	Not stated	Not stated	"Seriously affected" (details not given)
1942	Operator in dry cleaning shop	CCl_4	5 to 40 p.p.m. (20 av.)	Not stated	Not stated	"Had been nauseated"
1942	Worker in a metal cleaning operation	CCl_4	"It was estimated that 'his exposure was well below 50 p.p.m.' "	Not stated	"Job done inside a spray booth"	Nausea, vomiting, headache
1942	Girls in an instrument assembly room	CCl_4	"Believed certain that concentrations do not approach 100 p.p.m."	Not stated	Not stated	None given; "complained that the air was bad"
1942	Several girls in spotting operation	CCl_4	10 to 80 p.p.m. (35 av.); "each girl used about 1 quart of solvent per day"	Not stated	"The room was well ventilated"	Nausea, vomiting, belching, headache, drowsiness, etc.
1942	4 operators used a cleaner containing CCl_4 to remove ink from rollers of multigraph machine	CCl_4 (other contents not given)	40 to 375 p.p.m. (85 av.); about 1 gal. of cleaner used per day	Not stated	Not stated	Nausea, loss of appetite; 1 "sought medical treatment"
1942	Workers in a dry cleaning plant	CCl_4	35 to 115 p.p.m. (65 av.)	Not stated	Not stated	"Feeling sick"
1942	5 operators in a multigraphing room	CCl_4	No samples taken during exposure; over 1 qt. used "in a relatively small area"	Not stated	Not stated	Nausea
1942	Several girls in spotting operation	CCl_4	No air measurements made during exposure	Not stated	"Large well ventilated room"	"Several girls nauseated"
1942	Male workers in coating operation	"Partly CCl_4"	"Around 35 p.p.m."	Not stated	Not stated	"Affected slightly"
*1942	Female, 22, in room where jewelry was cleaned by dipping into open pan	CCl_4	Not stated	½ hour	All windows closed; no exhaust ventilation	Nausea, vomiting
1943	Man, 36, welding gasoline tank into which he sprayed CCl_4, to prevent an explosion	CCl_4 (gasoline?)	Not stated	4 hours	Not stated	Nausea, feeling of weakness, headache, vomiting (admitted to hospital on 9th day following exposure)

*Indicates year of occurrence; otherwise year reported.

AMERICAN CASES OF OCCUPATIONAL EXPOSURE TO CARBON TETRACHLORIDE IN THE MEDICAL LITERATURE SINCE 1932

Later Symptoms	Length of Illness	Consequences	Reported by	Remarks
None	No lost time apparently	No other consequences	HEIMANN, HARRY, and FORD, CHAS. A., N. Y. Indust. Bul., Vol. 20, 1941, Nos. 7-8	Report states that "laboratory findings (i.e., medical) were essentially normal"
Case 1. Pulmonary congestion, bronchopneumonia, necrotic hepatitis, acute nephritis Case 2. Anuria, icterus, coma, soft tissue, edema, uremic odor 3 others hospitalized with severe gastrointestinal upset and renal damage	Case 1. 10 days Case 2. 5 days	Case 1. Died Case 2. Died Rest recovered	PERRY, W. J., Army M. Bul., Oct., 1942, pp. 71-5	Author states: "Both individuals in the fatal cases cited above were heavy periodic drinkers and the latter is known to had have alcohol in the form of beer subsequent to exposure . . . Disease here encountered was an acute chemical intoxication enhanced by predisposing individual, occupational and hygiene factors . . ."
Aplastic anemia, granulocytopenia, purpura, toxic nephrosis and hepatosis, necrotic ulcerations of colon	5 days (?)	Died	MAYERS, MAY R., N. York St. J. M., June 1, 1942, p. 1079	Author cites this case as example of exposure to combination of chlorinated solvents
None	No lost time apparently	No other consequences	Ill. Labor Bul., May 31, 1942	During first inspection, it was noted that "it was common for some of the solvent to be spilled and form a pool on the floor"
Uremia; bilateral diffuse toxic nephrosis, necrosis of liver, bronchopneumonia	17 days (last 12 in hospital)	Died on 12th hospital day	ASHE, W. F., and SAILER, S., Ohio M. J., June, 1942, pp. 553-5	
None	No time lost apparently	None	ELKINS, H. B., J. Indust. Hyg. and Tox., Oct., 1942, p. 233	"It was considered possible that slightly higher concentrations might exist frequently"
None	No time lost apparently	None	ELKINS, H. B., J. Indust. Hyg. and Tox., Oct., 1942, p. 233	
None	No time lost apparently	None	ELKINS, H. B., J. Indust. Hyg. and Tox., Oct., 1942, p. 234	"Operator was equipped with a gas mask"
None	No time lost apparently	None	ELKINS, H. B., J. Indust. Hyg. and Tox., Oct., 1942, p. 234	No air measurement made
None	No time lost apparently	None	ELKINS, H. B., J. Indust. Hyg. and Tox., Oct., 1942, p. 234	No air measurements taken
None	No time lost apparently	None	ELKINS, H. B., J. Indust. Hyg. and Tox., Oct., 1942, p. 233	
None	No time lost apparently	None	ELKINS, H. B., J. Indust. Hyg. and Tox., Oct., 1942, p. 233	No medical report for the 1 operator who "sought medical treatment"
None	No time lost apparently	None	ELKINS, H. B., J. Indust. Hyg. and Tox., Oct., 1942, p. 233	Concentration "was reduced to 25 p.p.m., but there were still occasional complaints"
None	No time lost apparently	None	ELKINS, H. B., J. Indust. Hyg. and Tox., Oct., 1942, p. 233	"After installation of general ventilation, air samples revealed 10 to 25 p.p.m."
See Length of Illness	"1 girl's illness of several weeks attributed to the solvent" (reasons for conclusion not given)	None	ELKINS, H. B., J. Indust. Hyg. and Tox., Oct., 1942, p. 233	An air sample after installation of canopy hood and dilution with equal volume of naphtha showed 5 p.p.m.
None	No time lost apparently	None	ELKINS, H. B., J. Indust. Hyg. and Tox., Oct., 1942, p. 233	
Oliguria, gastric irritation, acute nephritis	"Discharged from hospital free from symptoms" in 4 weeks	Recovery	SMITH, A. R., N. Y. Indust. Bul., April, 1943	3 other girls affected by nausea and vomiting for 1 day but "recovered promptly. The woman who actually dipped the jewelry in CCl_4 was entirely unaffected"
Acute toxic nephrosis, edema, oliguria, proteinuria	About 2 months	"Apparent complete recovery"	CORCORAN, A. C., TAYLOR, R. D., and PAGE, I. H., *J.A.M.A.*, Vol. 123, No. 2, pp. 81-5	

FIRE EXTINGUISHER CASES

Year	Circumstances	Chemical	Degree of Exposure	Length of Exposure	Ventilation	Early Symptoms
*1919	2 men, engaged in electric welding inside lubricating oil tank in remote compartment of submarine at Portsmouth, N. H., Navy Yard. Molten metal was spilled on clothing of one, starting fire. Other man used extinguisher to put out fire. Smoke and fumes filled compartment. Helper fell unconscious, blocking exit. It was necessary to cut hole in bottom of tank to rescue men	CCl_4	Not stated	1 hour	None for ½ hour. For next ½ hour, hole cut in top of tank admitted some air	Unconsciousness; burns from fire
*1922	Interborough Subway fire, New York City, in which 7 extinguishers were used to put out fire caused by short circuit	CCl_4	Not stated	Not stated	Side door of car open; all car doors, windows and ventilators open	4 (of 7) fire-fighters felt no ill effects. 2 taken to hospital Passengers hospitalized showed only smoke inhalation symptoms
1938	Paperhanger used extinguisher to put out fire in hall when gasoline steamer blazed	CCl_4	Not stated	Not stated	"Narrow hall in which the ventilation was poor"	Difficult breathing, cyanosis
*1938	Salesman, 31, used extinguisher to put out fire in upholstery of automobile, inhaling "considerable smoke and fumes"	CCl_4	Not stated	½ hour	Not stated	Burning sensation in nose, throat and conjunctivae

*Indicates year of occurrence; otherwise year reported.

The Workman's Heart

—Abstract of Proceedings of a Symposium at a Joint Meeting of the Chicago Society of Industrial Medicine and Surgery and the Clinical Section of the Chicago Heart Association, November 1, 1943—

Reported by

C. O. SAPPINGTON, M.D., Dr. P.H.

THE IMPORTANCE of heart disease of various kinds with reference to the work of industrial employees (both the effects of pathological hearts upon work and contrariwise) has been evident for some time. Various phases of this subject were discussed at this meeting, as noted in the program which follows:

"The Placement in Industry of the Cardiac under Forty-Five Years of Age"— DR. WALTER S. PRIEST.

Discussion—DR. JOSEPH H. CHIVERS.

"The Placement in Industry of the Cardiac over Forty-Five Years of Age"—DR. CHAUNCEY C. MAHER.

Discussion—DR. THOS. C. BROWNING.

"The Significance of Rising Blood Pressure as Shown by Periodic Examinations"—DR. N. S. DAVIS, III.

Discussion—DR. H. GLENN GARDINER.

"The Effects of Trauma or Unusual Exertion on the Normal and Diseased Heart"—DR. DON C. SUTTON.

Discussion—DR. FREDERICK W. SLOBE.

DR. WALTER S. PRIEST discussed "The Placement in Industry of the Cardiac under Forty-five years of Age."

The internist sees many cases of cardiac disease which can function well in employment. The problems occurring are both sociological and medical.

The discussion in this instance was confined to congenital lesions and rheumatic fever in persons under 45 years of age.

Case histories were given of various types, including rheumatic fever and different varieties of congenital lesions. It was possible to fit these persons into industrial employment by knowing the types of jobs they were to fill and the capacities and limitations of the individuals. It was particularly stressed that the medical profession must be taught the necessity for adjustment and cooperation between the family physician and the plant physician in fitting the patient to the job.

In the sociological phase, one encounters misunderstandings on the part of the employer—he fears to employ cardiacs because of the possible disastrous outcome, in which he envisions fainting at work and other episodes at work which naturally affect the morale of other employees. Trial, however, has disproved this erroneous conception. As a group, cardiacs are more honest and attentive to their work and occasion no more lost time than so-called normals —moreover they show great willingness to attempt any kind of occupation within their limitations.

A series of case histories of 10 persons with cardiac disease was briefly summarized, only one of these being unable to work.

We should convince the employer of the good risk involved in selective placement of cardiac patients.

The Chicago Heart Association has facilities for the treatment of a few individuals, greatly limited, and needs further extension of its work.

The employer is, of course, afraid of another phase of this problem, and that is the legal limitations imposed in states where the laws provide for compensation for the aggravation of previous disability and permit no waiver at the time of employment; if these conditions continue, the doors of industry will probably be closed to cardiacs who are rated as unemployable under ordinary conditions. The Connecticut experience with waivers was cited as being extraordinarily successful.

In conclusion, it was stated that there is great necessity for cooperation between the industrial and family physicians, with social agencies, with employers, and with patients. Industrial physicians must decide if the individual is employable, in conjunction with conferences with the family physician; if necessary, a third opinion should be

FIRE EXTINGUISHER CASES

Later Symptoms	Length of Illness	Consequences	Reported by	Remarks
Pulmonary edema	Not stated	Died	U. S. Naval Bul., Vol. XIV, 1920	
Not stated	1 fire-fighter, 5 minutes 2nd fire-fighter, 1 day No information on passengers	2 hospitalized fire-fighters recovered; no information on passengers	New York City Transit Commission Report, July 24, 1922	Both New York City Transit Commission and U. S. Bureau of Mines made exhaustive investigations of the fire Bureau of Mines concluded: "... the symptoms can all be accounted for by the known effects of gases resulting from the burning of insulating materials, rubber, varnish and paint . . . the symptoms are not characteristic of phosgene or carbon tetrachloride poisoning" Transit Commission's physician stated: "In analyzing the bedside histories of all the cases admitted to the hospitals, the symptoms were those that would be found due to a certain extent to the inhalation of smoke and the rapid climbing of stairs 70 feet in height to reach the street surface from the train."
Flatulence, indigestion, rapid pulse, sinusitis	7 months, to date of report	See remarks	SEARLE, G. J., *J.A.M.A.*, Dec. 17, 1938, p. 2326	At date of report, patient was still under medical care
Malaise, headache, watery stools, vomiting, diarrhea, toxic hepatitis, acute nephrosis	23 days	Recovered	HAGEN, W. S., ALEXANDER, H. A., PEPPARD, T. A., Minnesota Med., Oct., 1940, pp. 716-8	Immediately after exposure salesman "took 1 or 2 alcoholic drinks"

brought to bear on the problem. It can be safely concluded that, with proper study and placement, cardiacs can be successfully used in industry.

DR. JOSEPH H. CHIVERS, in discussing the presentation by DR. PRIEST, wished that the whole problem was as easily soluble as it sounds it might be—it surely puts the industrial physician somewhat "on the spot." Cardiac cases certainly cannot be directly controlled after the man is on the job, because the industrial physician is seldom, if ever, the treating physician.

Three phases of the problem present themselves for consideration: (1) pre-employment and placement examinations, (2) periodic examinations on those appearing after vacations, changes of shifts or jobs, and the like; and (3) the medicolegal problem.

Case histories were cited where the decisions held that the employer was liable in different types of lesions, coronary, apoplexy, ruptured aneurysm. The employer must "take them as they are."

Mention was made that Connecticut and Indiana have different types of laws from some other states, excluding Illinois, because the laws provide for waivers.

Industrial physical examinations and examiners are inclined to make use of insurance standards—some revision is needed in our examination technique. The question of how far the examination should go or if it is thorough enough to cover various types of heart cases is a debatble one.

Another problem which has presented itself is certification by the family physician for changes of job or shift, or for leave—these certifications must receive serious consideration as to their validity.

Finally, industry has an excellent opportunity to place and supervise cardiac cases and to make the cardiac patient a self-sustaining unit in our national economy.

DR. CHAUNCEY C. MAHER presented the subject "The Placement in Industry of the Cardiac over Forty-Five Years of Age."

The case history was cited of a milk deliveryman who slipped, falling on a railing on a stairs, sustaining a contusion of the left chest. It was claimed that a coronary lesion resulted, but he had had this condition for five years previously. The problem became a compensation case and was settled.

We are concerned fundamentally in this discussion with hypertension and coronary disease. Most persons with hypertension finish with congestive heart failure through coronary attacks—about 10% end in apoplexy, and a relatively small number in renal failure; there are some who have pneumonia or some who have some type of accident.

Coronaries usually have hypertension and eventually have a thrombosis—many have congestive heart failure; leutics are difficult to deal with and usually come to a sudden end.

It should be stressed that there are probably more persons with hypertension already employed in industry than there are to be found outside. The usual examination in industry takes note of gross lesions only and probably is not detailed enough in the history. Individuals could be better placed if there were a more extensive examination. Periodic examinations should be more frequent and detailed in order to give better and more information.

It must be acknowledged that it is difficult to set dogmatic criteria for retirement—this subject needs individual evaluation and consideration of capacity relative to the specific job involved. Experience shows that there can be safe employment of many hypertensive individuals in heavy jobs, and that they are always reasonably safe in clerical or bench work. It should be pointed out that a patient with peripheral vascular disease of the lower extremities is not a good accident risk.

DR. THOMAS G. BROWNING, in discussing DR. MAHER'S presentation, sketched the difficulties of the small plant. The examination is not so well done and, in a considerable experience, there have been no rejections for coronary disease. Physicians do not see coronary disease until it is too late and in all such instances the previous

records have been clear. As might be expected, the opposite of this occurs with severe valvular lesions and gross defects.

There have been few instances in small plants of proper follow-up on cardiac cases and there is indicated much need for improvement in medical evaluation and subsequent medical supervision.

DR. N. S. DAVIS, III, discussed the subject "The Significance of Rising Blood Pressure as Shown by Periodic Examinations." (The full text of DR. DAVIS' presentation can be found in INDUSTRIAL MEDICINE, November, 1943, pp. 738-39.)

Although an annual examination of all employees has facilitated the promotion of good health under all circumstances in industry, such examinations are not enough in plants which use minerals and chemicals which may have toxic effects and cause industrial disease. Where there is a possibility of chronic poisoning, more frequent examinations are necessary. And in toxic exposures, there may be similar effects, as one finds in "hidden hunger" or dietary deficiencies. Moreover, thyrotoxicosis may also be involved. The work of Foulger was cited with reference to the possibility of a toxic pressor substance being concerned with the reactions which have been observed. The formula for scoring of blood pressures as used by Foulger was described, and other factors which have been listed by Foulger which may cause blood pressure changes similar to those caused by exposure to chemicals were reviewed.

The status of improper nutrition in the etiology of hypertension was illustrated by studies made on a group of air-craft workers in Southern California, although the report contained nothing about blood pressure data.

In reviewing evidence of this sort in evaluating blood pressure readings on workers exposed to toxic substances, other factors of non-industrial type which may cause such changes must not be overlooked. Each group and each individual having too many abnormal blood pressure scores or increasing numbers of them should be carefully studied so that the cause may be found and if possible, removed.

Executives should also be included, although they are not exposed to toxic chemicals, but other factors which cause blood pressure changes may be present and, if so, may be remedied.

In conclusion, blood pressure scores are of great significance and are essential if occupational diseases are to be prevented and if ill-health and absenteeism are to be reduced to a minimum.

DR. H. GLENN GARDINER discussed DR. DAVIS' presentation, and stated that the literature contained many generalities on this subject, but possibly a formula can be practically applied by the physician. He pointed out, however, that we need a much simpler scoring device, and perhaps more time can be spent to advantage on examinations, leading to a better evaluation of final results.

DR. DON C. SUTTON gave the final number on the program, "The Effects of Trauma or Unusual Exertion on the Normal and Diseased Heart."

This presentation consisted mostly of a group of case histories from the experience of the speaker.

In one instance, where the effort exerted by the individual had to be modified because of decompensation, the individual had traveled almost 12 hours every day and worked six.

In another case history of accidental trauma to the chest, heart damage seemed to follow as a normal sequence. Another case history of accident with an overloaded truck afforded an example of coronary disease apparently being developed after the accident, but the answer as to relationship was not evident.

In another instance, apparently a piece of glass had pierced the chest wall and lodged in one of the ventricles; the patient persisted in claiming this, without being believed by anyone, but the opinion was later substantiated at autopsy.

In a further remarkable instance, coronary thrombosis developed in a farm boy at the age of 20—there was no sclerosis evident.

DR. SUTTON felt that the normal heart could suffer damage from injury or strain, and that the diseased heart can also sustain damage from injury or strain, but with less severe trauma. The question arises whether acute dilatation can occur with a normal heart muscle. DR. SUTTON thought that acute failure might occur with damaged muscle, because of severe strain.

DR. FREDERICK W. SLOBE, in discussing DR. SUTTON'S presentation, stated that severe chest injuries in youngsters may cause a rupture of the heart without fracure of the ribs, but that the opposite usually occurs in older people.

It is believed that we should know more about the factors in each case to evaluate an injury with reference to its possibility of being an exciting factor in heart damage. Certainly coronary disease cannot be directly caused by trauma.

We should have evidence of damage and symptomatology characterized by such damage in a short period of time after the accident to establish a positive relationship, especially if the heart has been normal previously. The time relationship is important in all cases.

There are three factors which should be stressed with reference to the evaluation of cases: (1) the degree of strain or injury; (2) the degree of heart damage; and (3) the degree of neurotic tendency in the individual involved.

Finally, we must have detailed knowledge of the employee before injury, and a careful examination of the employee both at the time of employment and after injury.

Industrial Ophthalmology

—Proceedings of a Symposium held as a part of the 48th Annual Convention of the American Academy of Ophthalmology and Otolaryngology, October 10-13, 1943, Chicago—

Reported by

C. O. SAPPINGTON, M.D., Dr. P.H.

BECAUSE of the emphasis on the conservation of eyesight in industrial health programs, the Joint Committee of Industrial Ophthalmology provided a symposium on the subject of Industrial Ophthalmology as a part of the 48th Annual Convention of the American Academy of Ophthalmology and Otolaryngology, October 10-13, 1943, at Chicago, the chairman of the committee being DR. A. C. SNELL, Rochester, N. Y., and the secretary, DR. HEDWIG S. KUHN, Hammond, Indiana. The program follows:

"A Program of Ophthalmic Service for Small Plants" —DR. HARRY S. GRADLE, Chicago.

"How Can the Ophthalmologist be of Greatest Service to Big Business in Wartime?"—DR. CLARENCE D. SELBY, Medical Director, General Motors Corporation, Detroit.

"The Use of Visual Data as an Aid to Increase Production and Efficiency"—PROF. JOSEPH TIFFIN, Department of Applied Psychology, Purdue University.

"A Cross Section of Eye Service in Industry"—MR. C. P. TOLMAN, Consulting Engineer, National Society for the Prevention of Blindness.

"Treatment of Intra-Ocular Foreign Bodies"—DR. A. C. SNELL, Rochester, N. Y.

DR. HARRY S. GRADLE, in discussing the subject "A Program of Ophthalmic Service for Small Plants," quoted figures from the Illinois Society for the Prevention of Blindness—15% of blindness occurs from accidents.

There were several aspects to be covered in the program for small plants: from the point of view of efficiency, production, and economics, as well as reduction of insurance premiums; from the viewpoint of labor, which looks for comfort and safety; and finally from the viewpoint of management.

In this program, contact is made with management with which an agreement is made to conduct a visual survey, using the Bausch & Lomb Ortho-Rater with trained technicians. The data are put on punch cards and a report is made to employees. With this a safety survey of the plant is made, which is done in considerable detail.

A report is given to the employer with respect to certain of the findings without identification. Certain persons are recommended for further examination by ophthalmologists who are members of the opthalmological society, and, along

with this, recommendations are made relative to certain optical houses for glasses. A report is also given with recommendations with respect to eye hazards and illumination. The society is also prepared to put on a program of education with respect to safety practices.

The actual cost of these surveys is subsidized by various agencies and, in addition, a charge of 50 cents per employee is made. In conclusion, it was stated that the plan is still young but appears to be very successful.

IN THE ABSENCE of DR. C. D. SELBY, DR. CARL PETERSON, Secretary of the Council on Industrial Health of the American Medical Association, presented DR. SELBY'S paper on "How Can the Ophthalmologist be of Greater Service to Big Business in Wartime?"

The ophthalmologist is a consultant and is experienced in the care of injury to eyes, although this is a minor function. The question arises how the ophthalmologist can contribute to the industrial health program of large industries.

The prevention of sickness and the care of occupational diseases and industrial injuries are the objectives of a health service in industry, and reference was made to the "Outline of Procedures for Physicians in Industry," published by the American Medical Association Council on Industrial Health, March 19, 1942. In addition to outlining the duties of the physician in industry, the objectives of the service should be accomplished by (1) prevention of disease or injury in industry by establishing proper medical supervision of industrial materials, processes, environments and workers; (2) health conservation of workers through physical supervision and education; and (3) medical and surgical care to restore health and earning capacity as promptly as possible following industrial accident or disease.

In adapting these principles of ophthalmologic service in industry, DR. SELBY pointed out the following phases, among others: (1) Illumination studies with the reduction of eye fatigue; (2) participation of ophthalmologists in the routine pre-employment and periodic examinations; (3) health education with respect to the use of eyes and their care; (4) medical and surgical care for eye conditions—it is possible to make arrangements for part-time ophthalmologic service, as in present large industrial programs; and (5) research, as an example of which welding studies were mentioned.

With respect to goggle programs which are essential, industry has had some difficulty in getting the cooperation of ophthalmologists, and stimulation is needed in this direction.

In conclusion, the ultimate solution of services for large industries lies in the provision for part-time ophthalmologic services.

PROF. JOSEPH TIFFIN discussed the subject "The Use of Visual Data as an Aid to Increase Production and Efficiency."

This report was the result of four years' work at Purdue University covering several different types of eyesight surveys, including a group of 10,000 employees in a steel mill and a study of radio assembly. The objective was to help industrial groups solve their own problems—to spot trouble points, and it was realized that industry is most interested in production and efficiency.

Lantern slides showed photographs of the Ortho-Rater, the apparatus used for eye examinations, examples of tests, punch card forms, and the simple method of sorting punch cards.

It was possible to plot test scores against efficiency in various operations, and, from the results of such plottings, the visual pattern could be made for certain jobs involved. Several of these visual patterns were shown on the screen on lantern slides. The patterns varied considerably for different jobs, although this may not be so in the same plant.

The shift in age grouping to approximately 52% over the age of 45 presents some problems in this work. It was also found that there was a great increase in the number of applicants who showed defective vision in 1943 as compared with 1940—this may be a function of age or quality of individual.

It was pointed out that only the stereopses showed an increase by age up to age 30, appearing to be constant then up to age 45, and then falling off. Stereopsis also showed some possible relationship to job performance after age 30. It was also possible to spot the relationship between serious accidents and phorias.

It was believed that a simple statistical plan is hereby made available for industry, needing interpretation and follow-up by the ophthalmologist.

MR. C. P. TOLMAN reported on "A Cross Section of Eye Service in Industry."

It was believed that there was no greater deficiency of more vital importance than the failure to conserve and use vision in industry in the proper manner. It was thought that one in four persons has subnormal vision, seriously affecting output.

As proof of the need for greater extension of visual services in industry, a summary was given of an eyesight survey covering 50 plants of 12 to 25,000 persons, involving a total of 166,632 employees. The figures apply to (1) general safety provisions; (2) industrial eyesight supervision; and (3) the use of goggles or other protective devices conserving vision. Figures were given with respect to the number of employees covered.

In the general safety provisions, 98% of employees were covered by a safety program; 90% had medical supervision; 98% had enforcement rules; 100% had first aid facilities; 94% involved safety supervision; and 90% had school instruction in safety methods.

With respect to industrial eyesight supervision, 76% had no job analysis; 70% had no visual examination; 86% had no periodic eye examination; 42% had no provisions for the use of lenses in goggles; and 88% had no reporting of visual conditions with respect to accidents.

In the provisions for safety equipment protecting the eyes, 80% supplied goggles; 70% fitted the goggles; 64% sterilized goggles, and 34% provided periodic conditioning of goggles.

It can be seen that even in large industries the eyesight conservation program can be considerably improved.

IN THE ABSENCE of DR. J. G. TOWNSEND, Director of the Bureau of Industrial Hygiene, U. S. Public Health Service, DR. HEDWIG S. KUHN read a summary of a report with respect to the work of the various industrial hygiene units concerning eye conservation programs.

There are four problems in general: (1) ordinary diseases of the eye; (2) industrial accidents to the eye; (3) industrial diseases of the eye; and (4) visual defects needing refraction, especially on precision jobs.

In discussing these four points, it was pointed out that, among 3000 employees, 100 persons absent because of ordinary diseases of the eye accounted for 1,195 days lost, which represented 1.22% of the entire number of days lost in the group during a stated period.

With respect to eye accidents in industry, there is much time lost on the job and no figure was reported for this cause.

Industrial diseases of the eye are liable to vary considerably, and should be treated as they arise among industrial employees.

There has been no collection of national statistics with reference to visual defects needing refraction, especially on precision jobs, and no data showing the percentage of refractive errors existing among persons who are doing work which requires fine accommodation of the eyesight.

Finally, it was felt that the industrial hygiene units in the various states, as well as the Federal department, should be used by ophthalmologists, and that it is the desire of these groups to work with the Joint Committee on Industrial Ophthalmology.

THE FINAL number on the program was given by DR. A. C. SNELL, who discussed "Treatment of Intra-Ocular Foreign Bodies."

Important in this subject are the diagnosis, the location, and the type of material (which is mainly iron, 98%), although there is some glass, stone and wood encountered.

The sources are tools, machines, metals.

The entrance of a foreign body may not cause pain in many instances.

The cardinal signs are the presence of a perforating wound; soft eyeball; shallow anterior chamber; and loss of vision.

The history of the accident and the nature of the work are often the only indication that any accident has happened to the eye. X-rays should always be taken and charts prepared to show the location of the foreign body.

There was a detailed discussion given with respect to location of anterior foreign bodies and also with respect to those posterior to the lens. The use of the hand magnet has been successful in 80 to 98% of cases, but if this does not suffice, the giant magnet is used, which however is usually not successful.

It is common to give oral administration of an appropriate sulpha drug for a period of four days.

In summary, the presence, location, kind of substance, the route of entrance, are important points in diagnosis. The use of the large hand magnet has been successful in most instances; phenol and trichloracetate are used on the wound.

Aminothiazole

—Toxicity in Industrial Use—

R. M. WATROUS, M.D.,
Plant Physician, Abbott Laboratories,
North Chicago, Illinois

AMINOTHIAZOLE became of industrial importance soon after its derivative, sulfathiazole, was demonstrated to be an antibacterial agent of substantial merit. Sulfathiazole is synthesized commercially by coupling p-acetylaminobenzenesulfonchloride with aminothiazole, and the current demands for sulfathiazole require a national output of aminothiazole running into thousands of pounds per week. Crude aminothiazole must be purified by crystallization and by extraction with solvents, and must be dried and pulverized before it can be used. These processes involve the exposure of workmen to the chemical, and in my experience this exposure may cause toxic reactions which are described in this paper.

Certain properties of aminothiazole have a bearing on its industrial toxicity. The commercial product is a light yellow crystalline solid, melting between 85° C and 92° C. When purified by sublimation or by recrystallization from benzol it forms pure white, shining crystals. These have a tendency to turn yellow or brown after prolonged exposure to light and air. Aminothiazole is soluble in water; aqueous solutions up to 10% are easily prepared. Both crude and pure aminothiazole sublime readily; at a temperature of 50° C sometimes used in commercial drying, any nearby cool surface becomes thickly coated with the sublimate. Under such conditions, a characteristic odor is present.

M. T. Leffler[1] has found that aminothiazole will form colored complexes with various other compounds. One such reaction, using sodium beta naphthoquinone sulfonate in an alkaline solution, has been useful for assaying air samples. E. O. Krueger[2] has found that aminothiazole produces absorption in the ultra-violet at 2525 Å. The pigments ordinarily present in human urine do not obscure this band, though they render Leffler's color test unreliable.

In the synthesis of aminothiazole, a varying amount of colored impurities occurs. These "tars" vary according to the degree of their concentration from dark brown to black. Their exact chemical composition is unknown and probably variable; they are believed to be a mixture of polymers and condensation products. Aminothiazole seems to be slowly converted to "tar" by the action of air and sunlight, and in any place where aminothiazole vapor escapes into the air, all surrounding surfaces eventually become coated with a dark brown film. Workmen handling the crude chemical often show mahogany-brown staining of the hands, and transparent plastics, such as watch crystals or wristwatch straps, will also become stained. Despite the occurrence of this brown pigment by spontaneous changes, I have been unable to find any of the common laboratory reagents which will cause such color formation in solutions of pure aminothiazole.

Toxicity for Animals

R. K. RICHARDS, K. Kueter and L. Johnson[3] have furnished the following data as to the toxicity of aminothiazole for animals:

TABLE I: ORAL TOXICITY IN MICE

Number of Mice	Dose: Mg. per Kilogram	Number of animals which died
4	250	1
5 + 8	500	0 + 7
5 + 4	1000	5 + 4
5	1500	5
5	2000	5

The mice receiving the highest doses assumed the side position after 10 minutes, went into coma, and died within a few hours. The majority of those which died with lower doses did so within 18 hours; the remainder died within three days.

TABLE II: INTRAPERITONEAL TOXICITY IN MICE

Number of Mice	Dose: Mg. per Kilogram	Number of animals which died
4	100	0
10	200	1
10	300	5
10	400	5
10	500	10
4	600	4
4	700	4
4	800	4
4	1000	4
4	1500	4

The mice became depressed after injection. Those receiving fatal doses showed violent convulsions before death, which occurred two to eight hours after injection. Mice which survived showed swelling of the eyelids.

TABLE III: INTRAVENOUS TOXICITY IN MICE

Number of Mice	Dose: Mg. per Kilogram	Number of animals which died
5	250	0
5	500	2
5	1000	5

Death in these animals was sudden, and followed convulsions and respiratory paralysis.

Chronic toxicity: Three rats weighing 105 to 120 gm. were given by mouth 200 milligrams of aminothiazole per kilogram of body weight each day for four days. Urine collected after the fourth dose showed a trace of albumin but no sugar. It was dark brown in color. No aminothiazole could be demonstrated in this urine. These same animals were allowed to rest for six days, and then received 150 milligrams of aminothiazole per kilogram of body weight daily for eight days. They were killed on the ninth day. No gross pathological changes were observed in the internal organs. Microscopically, the stomach, pancreas and kidney did not differ in appearance from those of normal controls. The cardiac muscle showed slight cloudy swelling; the liver, marked cloudy swelling, with very indistinct cellular outlines, swollen and frequently poorly-staining nuclei.

Air Measurements in the Work-Place

AMINOTHIAZOLE dust was directly observed to be present in the air wherever the dry substance was handled in finely powdered form; the marked tendency of the chemical to sublime at moderate temperatures

made it seem likely that aminothiazole vapor would also be present. Therefore it was decided to use a midget impinger to collect the air samples, relying on the good solubility of aminothiazole in water to trap most of the vapor. The first collections were made with an improvised impinger, since the M.S.A. model was temporarily unavailable due to wartime restrictions. The apparatus was constructed of glass bottles and glass tubing; the position and diameter of the nozzle were the same as that of the M.S.A. model. Thirty cubic centimeters of distilled water were used to collect the dust and vapor, making a column about 5 cm. high. The aspirator was made from a bicycle pump, and was calibrated by drawing air out of a half-gallon jug inverted in a tank of water, care being taken to keep the water level the same both inside and outside the jug. On four trials, eight strokes were found to equal one-half gallon. Accordingly, 120 strokes were adopted as a standard volume, and were considered as equal to 1 cubic foot (27.6 liters). Later, a standard M.S.A. midget impinger was obtained, and air samples were drawn through 10 cc. of distilled water.

CHEMICAL ANALYSIS: The impinger samples were assayed by Leffler's color test, the technique for which was as follows:

Reagents:

1. Saturated solution of sodium beta-naphthoquinone sulfonate in 50 per cent ethyl alcohol.
2. Two per cent solution of potassium hydroxide in water.

Standards: Aminothiazole recrystallized from benzol, made up to concentrations of 1.0%, 0.1% and 0.01% (weight to volume) in distilled water. Where small concentrations are to be measured, the 0.01% standard is diluted with distilled water to give a series of standards containing 0.01, 0.008, 0.006, 0.004 and 0.002%.

Procedure: A 5-cc. aliquot of the sample in the collection bottle is placed in a test tube. 5 cc. of each of the standards and 5 cc. of distilled water (the control) are placed in test tubes of exactly the same size. To each tube are added 2 drops of the naphthoquinone reagent. Then, as quickly as possible, 2 drops of the potassium hydroxide solution are added to each tube. The canary yellow color of the naphthoquinone reagent changes to various shades of pink. The color comparison is best made after about two or three minutes, as the standards show their maximum difference at about this time.

Several locations and procedures were suspected of causing significant absorption of aminothiazole. These were:

1. Spreading finished aminothiazole on trays and placing these in drying ovens. Removing the dried product from the trays and running it through an oscillating mill into drums (all operations conducted in a small unventilated room into which the ovens opened).
2. Centrifuging crude aminothiazole crystals at the narrow end of a wedge-shaped building also used for synthesis and for heating wet mixtures of aminothiazole and "tar."
3. Attending to the heating of the mixtures mentioned above, either within the building or in the outside air.
4. Handling crude aminothiazole recovered by ether extraction from "tar," i.e., digging crystals out of a still and spreading them on trays.
5. Feeding purified aminothiazole into a rotary dryer in the same building as that used for 2 and 3.

The following are results of air sampling at these work-places:

Place and Conditions of Test	Apparatus Used	Mg. aminothiazoel per cu.ft.	Mg. aminothiazoel per liter
Dryer. Ovens full, closed and hot. No work. No dust.	Improvised	3.0	0.11
Centrifuge. No other operations in progress.	Improvised	0.1	0.0036
Dryer. Ovens off. Dry aminothiazole being spread. Dust present.	Improvised	1.0	0.036
Heating mixture of aminothiazole and tar in open air. Sample at tank rim.	Improvised	1.0	0.036
Filtering crude aminothiazole from tank at 53° C. inside building.	Improvised	0.3	0.011
Running crude aminothiazole solution into tank at 50° C. inside building.	Improvised	>0.3	>0.011
Centrifuge. Hot tar being run from tank in vicinity for last ⅓ of sample.	Improvised	>0.3	>0.011
Wide end of wedge-shaped building. No aminothiazole handled near this point.	Improvised	>0.3	>0.011
Operator's station on rotary dryer.	M.S.A.	0.1	0.0036
Filtering crude aminothiazole into tank at 50° inside building.	M.S.A.	.05	0.018
Wide end of wedge-shaped building. No aminothiazole handled near this point.	M.S.A.	0.1	0.0036
Two feet from trays standing in open air, on which was spread ether-extracted aminothiazole.	M.S.A.	0.2	0.0092

(Symbol: > means "less than")

Toxic Symptoms in Workmen

THE earliest symptom, complained of by practically all those who handled aminothiazole, was a deep brown discoloration of the urine. This was generally most marked in the evening after a day of exposure; it often disappeared by the next morning. It was not accompanied by any symptoms referable to the urinary tract, and reappeared intermittently for months as long as the men handled the chemical. Many men became accustomed to this and, when no other symptoms accompanied it, they grew to disregard it. One or two men who had handled aminothiazole for over a year stated they noticed polyuria during the day, but they were in the habit of drinking large volumes of water and did not have nocturia.

Examination of this dark urine revealed none of the common abnormalities. The tests for albumin, sugar and bile pigment were negative. The specific gravity was not sufficiently high to account for the color. Examination of the absorption spectrum with a small hand spectroscope revealed no bands characteristic of hemoglobin; there was a uniform absorption of all wave lengths shorter than green. A deepening of color occurred in the urine if it was allowed to stand overnight; a similar change could be produced by adding 1 cc. of 60% KOH to 5 cc. of urine. The addition of acid or of hydrogen peroxide to the brown urine caused the color to become lighter. The brown pigment could not be adsorbed on fuller's earth, but was removed by activated charcoal. Efforts to elute the pigment from charcoal with ethyl alcohol or water failed. Periodic blood counts made on men who frequently excreted such dark urine did not show any evidence of red cell destruction. The nature of the pigment, therefore, is obscure, but it probably represents a conjugated, polymerized or oxidized form of aminothiazole. The appearance of pigment in the urine is a reliable sign of aminothiazole absorption; brown urine has been present in every man complaining of toxic symptoms.

Another symptom of aminothiazole exposure was anorexia. This was experienced in all degrees, and sometimes progressed to nausea and vomiting. A marked variation in susceptibility was noted; of two men doing identical work, one might become nauseated

while the other felt perfectly well. Nausea was more likely to occur in workmen new to the job, and some of the experienced workers believed that new men became less susceptible after a few weeks of exposure. It was not possible to correlate the occurrence of this symptom with the degree of exposure as indicated by air samples, but my impression is that individual sensitivity is of more importance than the degree of exposure.

Contact dermatitis was not common among aminothiazole handlers, and when it did occur was of a type which might easily have been provoked by the alkalinity of the solutions rather than the chemical itself.

Allergic Type Syndrome

THE most striking manifestation of aminothiazole toxicity is a peculiar syndrome, resembling serum sickness in many respects, which has been observed in three workmen up to the present time:

THE FIRST case was that of a 27-year-old white man, married, who had formerly been employed in a shoe factory. He had often mixed shoe dyes, but denied ever having had any dermatitis. There was no previous history of urticaria or other allergy. His pre-employment examination was essentially negative except for a scar at the site of an old herniorrhaphy, a few missing teeth, and flat feet. He was exposed to aminothiazole in the oven dryers one Saturday, having previously worked with the chemical in various operations for 18 days. The following day he noticed severe itching over his entire body, accompanied by the appearance of evanescent wheals. Examination at this time confirmed the presence of urticaria. This continued on the following day, when moderate edema of the hands and feet appeared. The next day pain and stiffness appeared in the shoulders and elbows, and for many days thereafter these and other joints of the body were transiently affected in the same way. The urticaria began to subside on the ninth day of the illness, but migratory joint pains continued to incapacitate the patient up to the 36th day, gradually lessening in severity. Recovery was practically complete by the 36th day, and no permanent disability resulted.

THE SECOND case was that of a married white man, 41 years of age, formerly an advertising executive. His pre-employment physical examination was essentially negative except for slight obesity, moderate diminution of hearing and slight loss of flexibility in the lower back. He had previously suffered from urticaria, which his physician believed was caused by a barbiturate, and he was subject to hay fever, beginning about the middle of August. In the past the hay fever had been severe enough for him to undertake desensitization treatment. He worked in aminothiazole manufacture about two weeks without any untoward symptoms; he then had an attack of nausea and vomiting, accompanied by dark brown urine. He attributed this to causes other than his work, and continued to handle the chemical. A week later he complained of severe itching all over his body, accompanied by pain and stiffness in several joints. There were no wheals, and the patient, who had previously had urticaria, was positive there had been none. The itching subsided somewhat within the next two days, but the joint pain continued to be severe, migrating to the elbows, shoulders, knees, ankles, fingers, and temporo-mandibular joint. On the second day of the illness, the patient complained of a severe sore throat; his temperature was 99.6 and his pulse 120. The throat did not appear red or swollen, and the blood count was normal. On the fourth day, his mouth and lips became painful and there was a sensation of numbness in both hands. The itching continued to be troublesome until the seventh day of illness, and then rapidly disappeared. The migratory joint pains, with limitation of motion, continued to incapacitate the patient until the 27th day of illness, gradually lessening, and finally disappearing completely. During the first two weeks of the disease, which fell in the last part of August, the patient was surprised to find he did not suffer from hay fever, as in previous years. As he began to recover, his hay fever appeared as usual.

THE THIRD case was that of a married white man, 40 years of age, formerly the operator of a bulk gasoline and fuel-oil business. He denied any extensive exposure to gasoline or oil fumes, or to fumes of tetraethyl lead. His pre-employment examination was negative except for a blood pressure of 150/100, moderate obesity, and moderate diminution of hearing for high tones. He did not regularly handle aminothiazole, but was employed making liver extract and in various operations involving the extraction of vegetable drugs. One or two days every two weeks, he would handle a batch of ether-extracted aminothiazole, precipitating it from aqueous solution and drying the residue in a centrifuge. He had been employed about two months without any symptoms. There was no past history of urticaria or other allergy. He centrifuged batches of aminothiazole on two days, and noticed his urine was dark brown on the evening of the second day. He became nauseated and vomited at this time, and shortly afterward began to notice itching all over his body, accompanied by the appearance of evanescent wheals "like mosquito bites." His hands and feet were quite swollen. He stayed in bed the next day, but reported for examination on the third day of illness. At the time he felt somewhat better, but still suffered from bouts of intense itching. The itching continued until the fifth day of the illness, but decreased in intensity. The swelling of hands and feet persisted until the fifth day. The patient returned to work on the fifth day, but did not come in contact with aminothiazole. However, he had worked only four hours when urticaria reappeared, accompanied by pain and stiffness in the knees and shoulders. The joint pains continued for 12 more days, but the urticaria disappeared quickly and did not return. On the sixth day of the illness, sore throat appeared, and the patient remarked that this was unusual, as he had not had a sore throat for many years. The sore throat disappeared about the ninth day. On the tenth day of the illness, the patient complained of extreme weakness in the flexor muscles of both forearms; examination confirmed the weakness of the hand grasp. On this day he noted a marked sense of "heaviness" in the legs. On the 29th day, all symptoms had disappeared, and the patient returned to work.

ONE OTHER case, the earliest one observed, differs from the preceding three in that there was no complaint of joint pains and the dermatitis was of a more acute and alarming nature. The patient was a single white man, 19 years of age, who had formerly been employed as a lace-maker. The pre-employment examination was negative except for very poor teeth and flat feet. He was employed for exactly one month in the various operations concerned with aminothiazole. He handled the material in the oven dryer one Saturday, but noticed no symptoms until the following Monday, when he awoke to find his eyelids so swollen he could not open them. During the course of that day, an itching dermatitis appeared on his face and spread to his entire body. On the second day of illness, examination revealed generalized edema of the skin over the entire body. On this was superimposed a patchy, pinkish maculopapular rash. The patient complained bitterly of the intense itching. By the fourth day, the itching had subsided considerably, and the swelling of the face had disappeared, but the tongue was swollen. The patient recovered com-

pletely by the eighth day, and returned to work. He made no further complaints up to the time he left to join the army 18 days later.

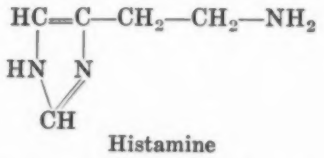
After the details of some of these cases became known among the aminothiazole workers, there was a minor epidemic of non-specific complaints attributed to the effect of the drug. Many of these could be dismissed as having no causal relationship, but others seemed to deserve more consideration. Among the latter were the complaints of three men at various times that they had been gaining weight at what they considered an abnormal rate, that their hands and faces felt "puffy" to them at times, and that these symptoms were accompanied by a definite lethargy and ease of fatigue. One of these men was weighed accurately, and his urine was examined for the presence of albumin, red cells and casts, none being found. His basal metabolic rate was determined to be —9%. He was removed from contact with aminothiazole, but was instructed to carry on every other activity as usual. In nine days he lost nine pounds, and then kept a constant weight.

Comment

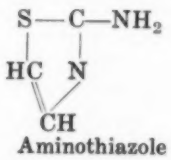
STUDIES on animals do not reveal aminothiazole to be a very toxic chemical, though it is considerably more toxic than its derivative, sulfathiazole. The extent to which this substance may be absorbed through the skin has not been determined and this route must therefore not be disregarded. The air, which contains both dust and vapor, certainly is able to convey appreciable amounts into the body. The air-sampling methods never showed more than 3 milligrams per cubic foot (0.11 mg. per liter), and thus the maximum amount which might be absorbed in eight hours is about 450 milligrams. This is but a small fraction of the lethal dose as determined in animals, but appears to be sufficient to produce a brown discoloration of the urine, and in some peculiarly susceptible persons seems enough to set off a train of symptoms of an allergic type, which may persist for a month or more.

The fate of aminothiazole in the body is unknown, but, on chemical grounds alone, this rather unstable compound would not be expected to remain unchanged in the presence of the many active chemical systems of the tissues. No aminothiazole as such could be found in the urine of animals receiving sublethal doses or in the urine of workmen known to be exposed. Deichmann[4] found that there was no increase in the urinary output of conjugated sulfates or glucuronates following the feeding of aminothiazole, so presumably this common method of detoxification is not utilized. It seems reasonable to suppose that the brown pigment observed in the urine of experimental animals and workmen alike represents a degradation product of aminothiazole, but chemical proof is lacking.

The chemical structure of aminothiazole bears a slight resemblance to that of histamine, as may be seen by comparing the two structural formulas:



Histamine



Aminothiazole

The metabolism of histamine in the mammalian body is known to be intimately concerned with the enzyme histaminase. It is still an open question just what part disordered histamine metabolism plays in many forms of allergy, or how important are fluctuations of the histaminase level in allergic disorders. If it is assumed that aminothiazole, because of its structural resemblance to histamine, may form a firm combination with histaminase, thus rendering that enzyme inactive, a theory can be constructed to explain the observed disturbances of an allergic nature on the basis of deranged histamine metabolism. This assumption could readily be tested by experiments *in vitro* to determine whether aminothiazole does or does not inactivate histaminase, but lack of suitable facilities at present precludes this work.

Summary

AMINOTHIAZOLE, an intermediate in the synthesis of sulfathiazole, has become a chemical of some industrial importance, and because of its physical properties may readily be absorbed by chemical workers who handle it.

2. A number of workmen exposed to air concentrations ranging from 0.1 to 3.0 milligrams per cubic foot (0.0036 to 0.11 mg. per liter) complained of certain characteristic symptoms, the commonest of which were brown pigmentation of the urine, anorexia, nausea and vomiting.

3. A few workmen, probably having developed a special sensitivity, responded to ordinary exposure by a syndrome of sudden onset, closely resembling serum sickness, and consisting of severe itching followed by severe migratory pains in the joints which incapacitated them for periods up to five weeks. Complete recovery without residual damage followed.

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The Effect on the Rat of Prolonged Administration of Large Doses of Electrically Activated Vaporized Ergosterol

CHAPMAN REYNOLDS, M.D.,
and
EDWARD L. BURNS, M.D.,
—Department of Pharmacology and Experimental Therapeutics, and Department of Pathology, Louisiana State University School of Medicine, New Orleans—

A PREVIOUS review of the clinical and experimental literature on the use of massive doses of vitamin D in arthritis and other conditions,[1] indicated that electrically activated ergosterol was less toxic than other vitamin D preparations.

Recently, Klassen and Curtis[2] carefully studied the calcium and phosphorus metabolism before, during and after the administration of large doses of electrically activated ergosterol (Ertron*) in four patients. Two of these had atrophic spondylitis, and two had degenerative arthritis of the spine. Their ages ranged from 28 to 71. For four three-day periods, beginning with a dose of 200,000 units per day, the dose was increased by 200,000 units during each of the two succeeding three-day periods, so that during the last period each patient received 1,000,000 units per days. None of the patients showed signs of toxicity; there were no gastro-intestinal disturbances; there was no loss of weight, and no marked change in the clinical picture. The blood pressure remained normal. There was no change in the amount of urine excreted daily. There was no appreciable change in the average level of serum calcium during the entire period of treatment. No demonstrable changes occurred in the activity of

*Electrically activated vaporized ergosterol (Whittier process).

the parythyroids or the thyroids. There was an increase in the appetite of all four patients during and also after the treatment. This experiment tested the effect of massive doses of Ertron on the physiological processes of the body and was not concerned with the therapeutic effects.

Snyder, Squires and Forster[3] have recently reported that, during a period of six years in which they used electrically activated ergosterol (Whittier process) in a group of 250 cases, they had never seen any evidence of serious toxicity as a result of the administration of from 200,000 to 400,000 units per day.

A year previously the same group[4] stated: "The safety of this form of therapy has, we believe, been established. The various criteria for determining toxicity were studied. During the 12-month period of treatment, none of the following occurred: No increased calcification of blood vessels was observed, either roentgenologically or by ophthalmological examination of retinal vessels. Renal function was not impaired as shown by repeated chemical and microscopic urinalyses and by the N. P. N. remaining normal. Gall-bladder function was not impaired. Evidence is presented to suggest some improvement of impaired gall-bladder function occasionally taking place."

Wolf,[5] using electrically activated ergosterol (Whittier process) in the single massive dose treatment of rickets, gave 600,000 units to five children from five to 18 months old. "No ill effects were observed." In 1943[6] he summarizes: "In this series, 75 infants were given 600,000 U. S. P. units of an electrically activated preparation of ergosterol (Ertron), divided in two oral doses in precooked cereal and milk at about the third to the fifth month of life . . . (These doses) were well tolerated, and no toxic manifestations were observed, such as loss of weight, vomiting, or anorexia. Rather, these infants thrived exceptionally well. No diminution in the incidence of respiratory infections was noted. There is no danger in administering single massive doses of vitamin D to young infants, even premature infants. The danger lies in repeating these large doses over a period of time so that several million units of vitamin D are given. Depending on the age and weight of the infant, such large doses may be toxic if repeated daily . . . The administration of a single massive dose of vitamin D for the prophylaxis of rickets is not only of proved effectiveness, but also is safe and time saving." In a more recent paper[7] he reports further clinical and histological evidence of the safety of Ertron. The paper includes an excellent bibliography and review of the litertaure on toxicity-safety of the various vitamin D components and preparations.

Other and earlier evidence of the relative safety of high dosage Ertron therapy may be found in the bibliography of a previous study.[1]

These evidences were so provocative that we undertook to determine the effects of long continued daily administration of large doses of Ertron to the rat.

Our chief interest was in the histological examination of organs and tissues of animals sacrificed at the end of various periods of intensive treatment. Secondarily, x-ray studies were made of half the rats in each group.

TABLE I.

Animal number	I. U. per Kg. daily	Days of treatment
10, 11	4,000	100
12, 13, 14		127
15, 16, 17, 18, 19		190
20, 21	8,000	100
22, 23, 24		127
25, 26, 27, 28, 29		190
30, 31	12,000	100
32, 33, 34		127
35, 36, 37, 38, 39		190
40, 41	20,000	100
42, 43, 44		127
45, 46, 47, 48, 49		190
C1	0	100
C2, C3, C4	0	127
C5, C6, C7	0	190

Material and Methods

FORTY-SEVEN male white rats weighing 85 to 107 gm. were divided into four treated groups of 10 animals each; seven animals served as controls. All were equally provided with water and Purina dog chow plus lettuce once or twice a week.

The four treated groups were given, by pipette, a daily dose of Ertron as indicated in Table I. The drug was dissolved in corn oil in varied concentration, so that the daily amount of oil administered was the same for each group.

At the end of 100 days of medication two rats from each of groups 1, 2, 3 and 4 and one from group C (control) were killed.

At the end of 127 days three rats from each treated group and three controls were killed.

At the end of 190 days of medication the remaining

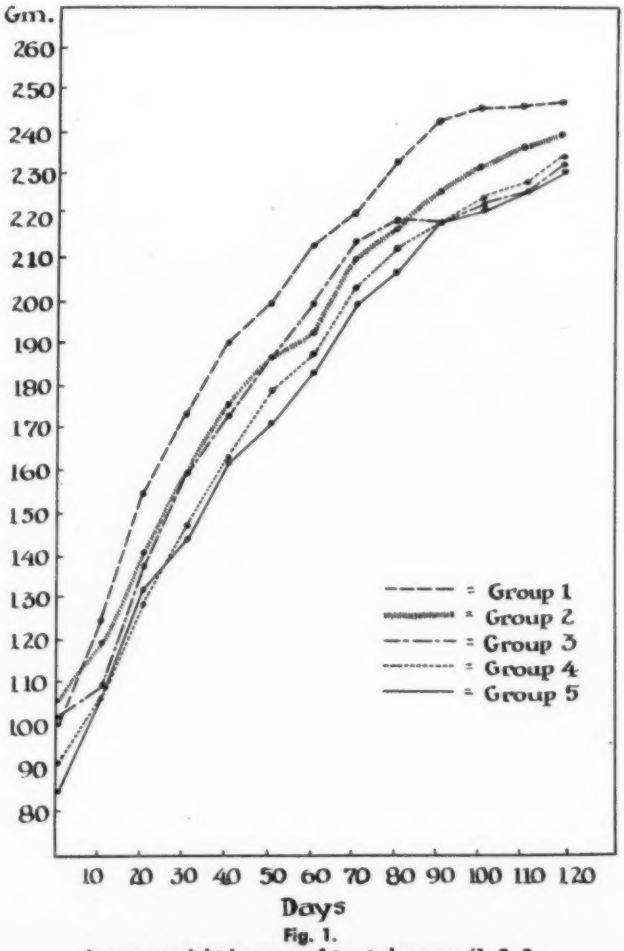
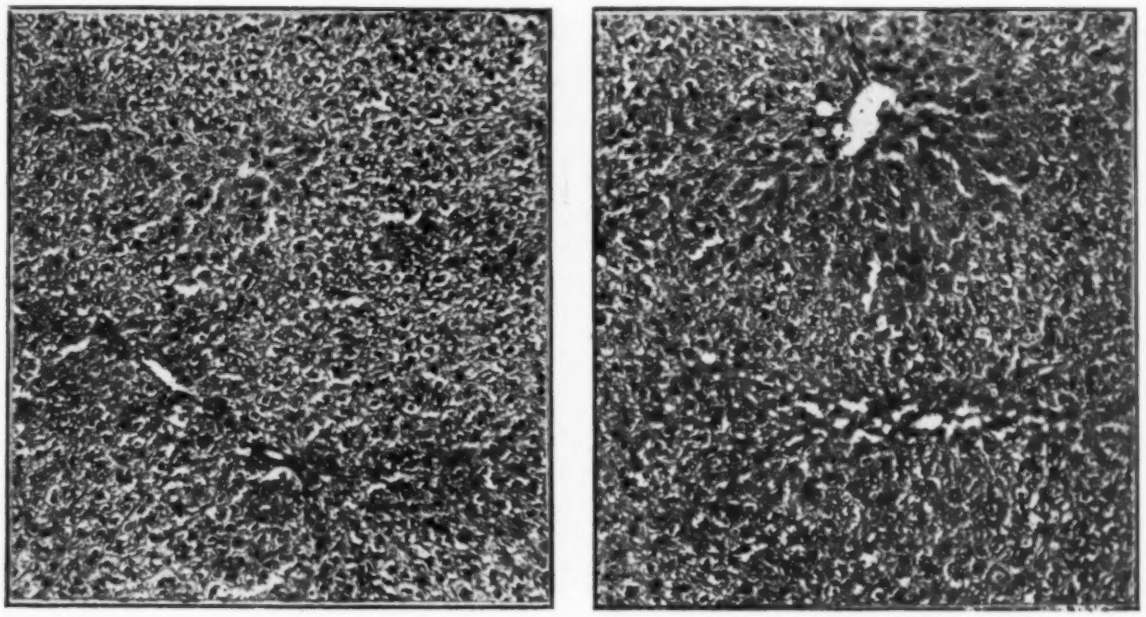


Fig. 1.
Average weight increase of treated groups (1, 2, 3, 4) and controls (5) for first 120 days. See Table I.



A Fig. 2. B

(A) Liver of rat treated with 20,000 I. U. of electrically activated ergosterol per kg. daily for 127 days. The cytoplasm of the cells about the central veins shows clear vacuoles. Hematoxylin and eosin stain. X 100.
(B) Liver of untreated control rat. The cytoplasm of the cells about the central veins shows vacuolization similar to that seen in the treated animal. Hematoxlyn and eosin stain. X 100.

five animals of each treated group and the three remaining controls were killed and promptly x-rayed. All animals were killed rapidly by chloroform in a closed jar.

Histologic studies were made on formalin fixed tissues removed from rats treated for 100 and 127 days and from the control animals in these groups. Paraffin sections, stained with hemotoxylin and eosin, were prepared from the lungs, liver, spleen, pancreas, stomach, adrenal glands, kidneys, aorta and brain. Bone sections from the lower end of the radius and ulna, and including the carpal bones of the fore foot were prepared from animals treated for 100 days, and sections from the lower end of the femur were prepared from the animals treated for 127 days. Bone tissues were decalcified in weak HNO_3 solution; embedded in paraffin and stained with hematoxylin and eosin.

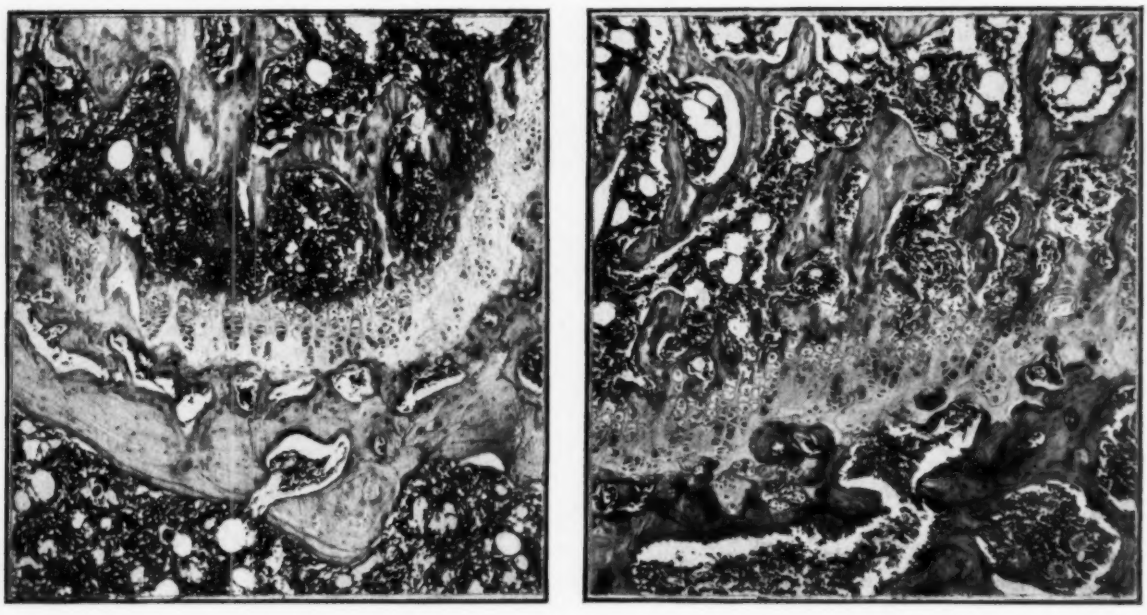
Results

GENERAL: The average growth curves for groups 1, 2, 3, 4 and C (control) showed no significant divergences (Fig. 1). No indication of diarrhea, anorexia or lassitude was noticed. All animals survived, apparently in normal health, until sacrificed.

HISTOLOGICAL: As compared to respective control tissues, no changes were noted in the heart, lungs, liver (Fig. 2), spleen, pancreas, stomach, adrenal glands, kidneys (Fig. 3), aorta and brain. The medium-sized and small blood vessels in the organs studied showed no changes. No areas of metastatic

A Fig. 3. B

(A) Kidney of rat treated with 20,000 I. U. electrically activated ergosterol per kg. daily for 127 days. No changes are noted in the glomeruli, tubules, or small or medium sized arteries. Hematoxylin and eosin stain. X 100.
(B) Kidney of untreated control rat. Hematoxlyn and eosin stain. X 100.



A B

Fig. 4.

(A) Lower end of femur of rat treated with 20,000 I. U. of electrically activated ergosterol per kg. daily for 127 days. Regular rows of cartilage cells which become regularly transformed into bone tissue are present at the epiphyseal line. No changes are seen in the trabeculae or marrow. Hematoxylin and eosin stain. X 80.
(B) Lower end of femur of untreated control rat. Hematoxylin and eosin stain. X 80.

calcification were found. Comparative studies of bone tissues showed the epiphyseal lines of both experimental and control animals to be composed of regularly arranged rows of cartilage cells which became sharply transformed into bone tissue. There was no abnormal proliferation of endosteal or periosteal bone, nor was any evidence of decalcification noted. The marrow cavities of both experimental and control animals showed blood forming cells mixed with fat tissue (Fig. 4).

RADIOLOGICAL: Roentgenograms of the rats which had 190 days of dosage showed no signs of alteration in bones, joints, cartilages or other structures as compared with controls. (See Figs. 5. 6, 7.)

Discussion

THE experimental periods were considered adequate, as they represent from 1/11 (100 days) to 1/6 (190 days) of the average life of the rat. We wish to emphasize that the material was administered to the

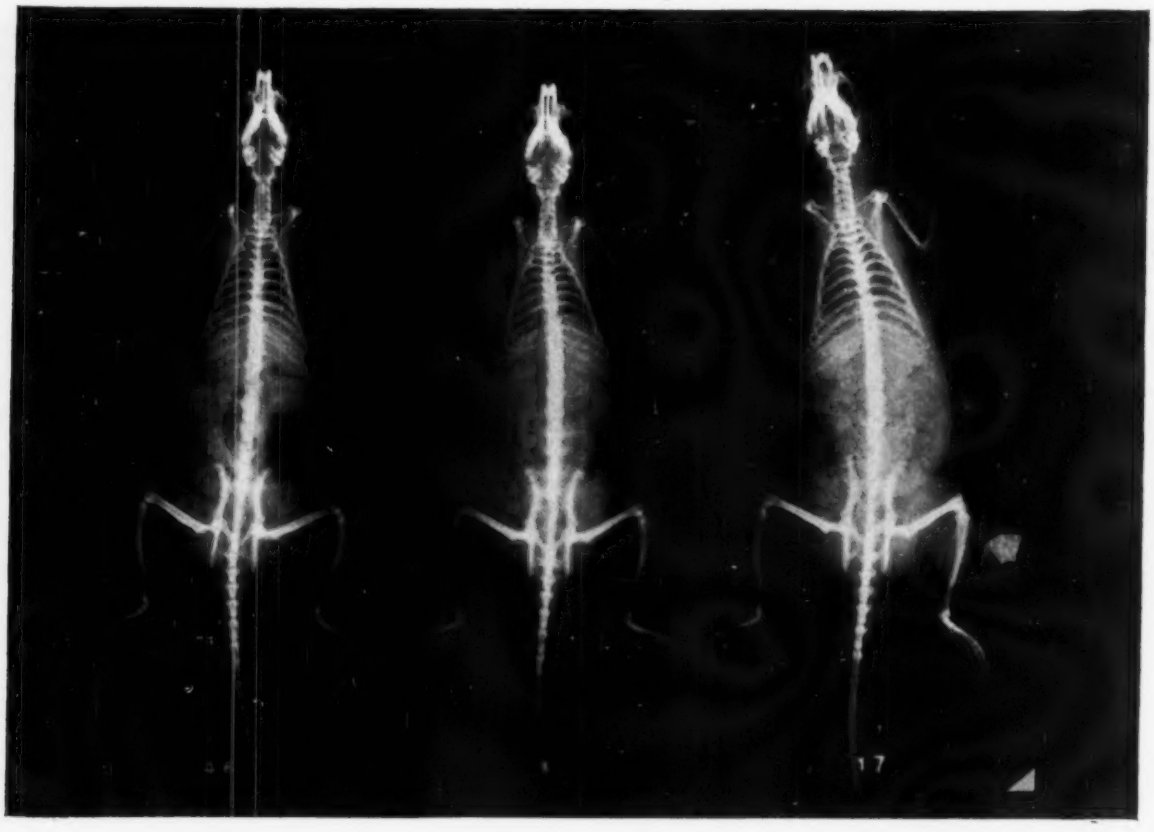


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Fig. 5.

Comparative roentgenograms of treated and untreated rats at the 190th day. See Table I.

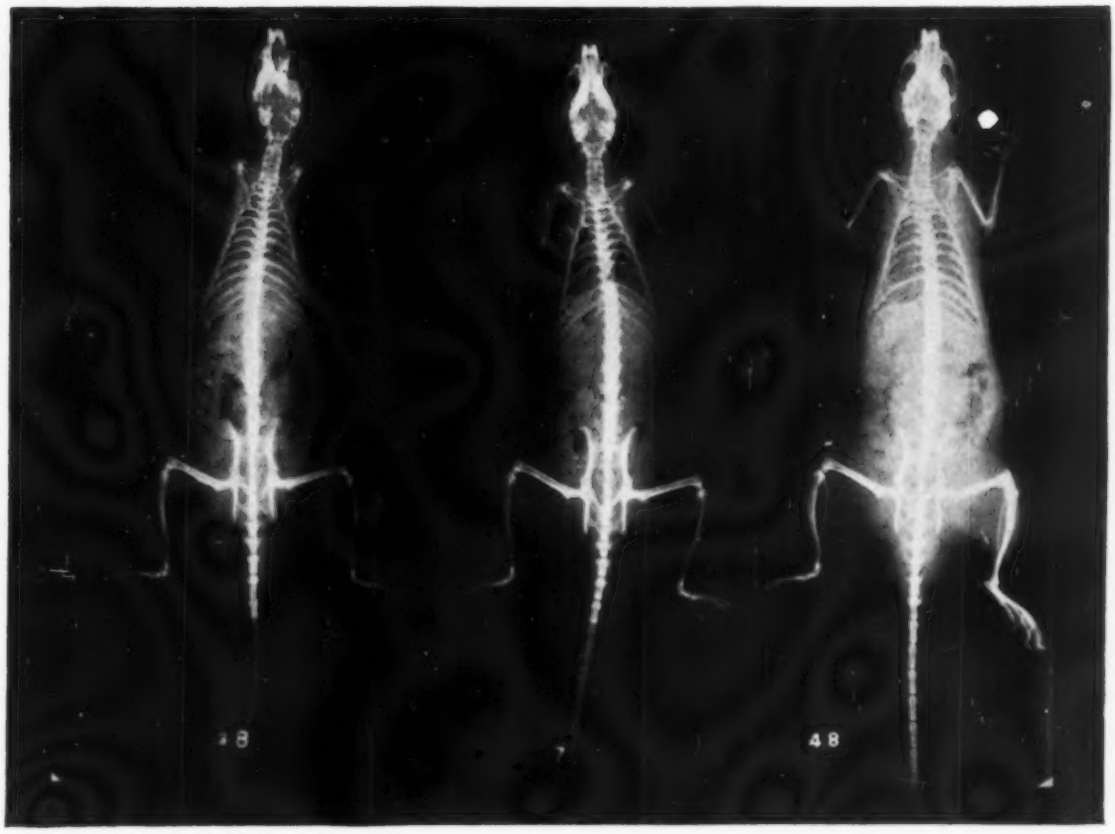

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Fig. 6.

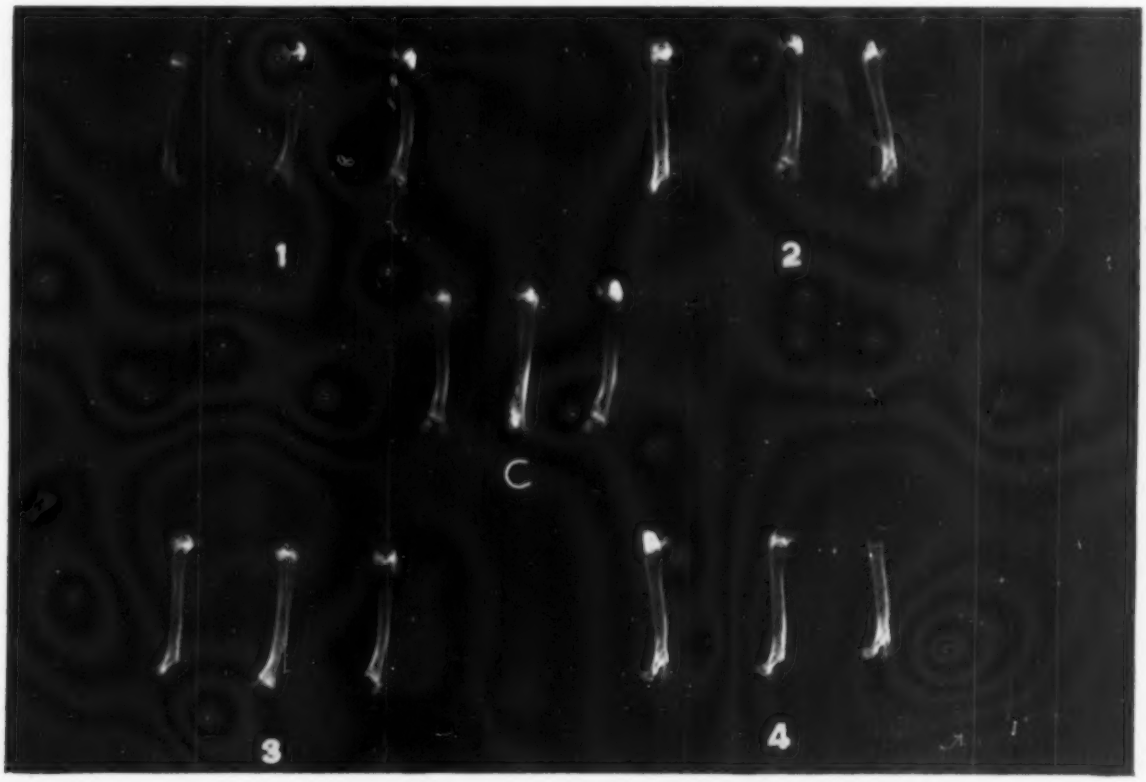
Comparative roentgenograms of treated and untreated rats at the 190th day. See Table I.

animals during their most active period of growth.

Since there are about 10 forms of vitamin D known it should also be emphasized that the above observations are based only on the one preparation used, and are in no sense comparative.

Summary

IN THE RAT, daily doses of electrically activated ergosterol up to 20,000 I. U. per kg. for 127 days produced no histological changes as compared with control animals or those receiving smaller doses.



1. 4,000 I.U. per Kg. C. Control 2. 8,000 I.U. per Kg.
3. 12,000 I.U. per Kg. 4. 20,000 I.U. per Kg.

Fig. 7.

Comparative roentgenograms of femurs of treated and untreated rats at the 127th day.

2. Similarly, rats receiving up to 20,000 I. U. per kg. daily for 190 days showed no discernible radiological alterations in the body structures.

3. None of the animals showed any signs of toxicity at any time. All survived, apparently in normal health, until the time of sacrifice.

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Brucellosis

—A Preliminary Report of Cases Treated with Radioactive Colloidal Manganese—

O. W. SCHREINER, M.D.,
Medical Director, Wilson & Co., Chicago

Brucellosis is a comparatively new disease in the United States although it is believed to have prevailed in the region of the Mediterranean for centuries. It has been known by various names, such as Gibraltar fever, Mediterranean fever, Neapolitan fever, and Rock fever, but was most generally called Malta fever.

In 1887 Sir David Bruce isolated the micrococcus melitensis from the spleen of a person who died of fever on the island of Malta, thus establishing the cause of the disease in man. The generic name, Brucellosis, was suggested in 1920 by Meyer and Shaw, in honor of Sir David Bruce for his discovery of the cause of the disease.

In 1885 Bang, of Denmark, isolated Bacillus abortus from the placenta of aborting cattle, and contagious or infectious abortion in animals has been associated with the organism, and has become known as Bang's disease.

It was not until 1924 that Keefer isolated B. abortus from a human case of undulant fever. In 1926 Merriam and Carpenter discovered that man may contract the disease merely by drinking cow's milk which contains Br. abortus. Identical organisms can be isolated from the blood of persons who have undulant fever, and from the milk they have ingested. Pregnant heifers inoculated with human strains of undulant fever will also undergo abortion. Thus, while the disease has never been proved to be transmissible from person to person, the identity of its behavior inroads between man and animals is shown in these historic researches.

Investigations during the past 40 years have shown indisputably the relationship between contagious abortion in domestic animals and undulant fever in man. Three biological types are recognized: (1) Brucella melitensis, the goat strain; (2) Brucella abortus, the cattle strain; (3) Brucella suis, the swine strain. These are so classified because of their prevalence in these animals.

The Brucella are short, gram-negative, non-motile coccobacilli. Some strains are definitely rod-shaped. All three species are microaerophilic. B. suis can usually be isolated under normal atmospheric conditions. B. abortus requires an atmosphere of from 8% to 10% carbon dioxide. Brucella organisms are usually viable. They have been found alive after three months in the soil, after two months in Roquefort cheese, in refrigerated butter after four months, and in refrigerated milk after 10 days. Direct sunlight seems to destroy them.

In man brucellosis is endemic in areas where the disease is prevalent in domestic animals. Unpasteurized dairy products seem to be the common source of infection. Farmers, stock-yard workers, veterinarians coming in contact with them or with infected animals are susceptible to involvement; also vulnerable are investigators working with Brucella cultures, or with the experimental disease in animals. Students in bacteriological laboratories are no longer allowed to handle living cultures of Brucella, as many laboratory workers have contracted the disease. The high infectivity of the Brucella was illustrated by an outbreak of B. melitensis infection in which at least 80 cases of the disease occurred and one death. Three times as many cases occur among young adult males as among females. Children are less susceptible. The age incidence seems to be greater during the second and third decades of life.

The presence of Bang's disease in cattle varies widely in different communities. It is generally more widespread in dairy than in beef cattle. Serologic tests carried out in 11,858,859 cattle showed 38% of the herds and 8% of the animals were infected. If cattle become infected with B. suis, there will be milk-borne outbreaks of human brucellosis.

Programs for eradicating Bang's disease in cattle are in effect in nearly every state in the Union, and usually are carried out in cooperation with the U. S. Bureau of Animal Industry. The measures employed in this program include sanitary precautions in barns, yards, and pens; fencing off of suspected infected areas of pastures, disinfection of barns, etc., which have been contaminated, and vaccination of heifers in areas where the disease is known to be prevalent. According to the U. S. Dept. of Agriculture there is no known drug or chemical or combination that has the slightest curative effect in Bang's disease. We have been unable to find any work that has been done with Colmetanese in treating this condition, but we feel that research in that direction would offer interesting possibilities.

In spite of the campaigns to eradicate the infection in animals and to control it in people by requiring the pasteurization of milk, brucellosis shows no evidence of decline. In the State of New York for instance where both control methods have been widely employed, the number of cases reported during the past 10 years does not show any definite trend toward increasing or decreasing.

The first case of Malta fever occurring in the United States was reported by Craig in 1905. At the present time it is recognized as a major public health problem.

In dairy states Br. abortus is the chief cause of undulant fever; in the hog-raising areas of the middle west, swine are the main sources of infection. In the southwestern states cases of human brucellosis of caprine origin have been demonstrated. It occurs more frequently in the summer months.

Diagnosis is difficult to establish. There are two forms, acute and chronic, which is why laboratory tests are so essential in differentiation. The laboratory procedures of value in diagnosis are the agglutination test, the intradermal test, cultural studies, white blood cell and differential counts, and opsonocytophagic tests.

If brucellosis is suspected, all contacts of the patient with domestic animals should be recorded in the patient's history. When the Brucella organism cannot

be recovered from the patient a proved source of infection is of value in establishing a diagnosis based on clinical symptoms. The possibility of improper pasteurization and the use of raw cream or butter, which harbor enormous numbers of the Brucella organism, should not be overlooked. The standard method of pasteurization by heating milk to 142° (F) for 30 minutes destroys the Brucella.

Patients having headache, malaise, weakness, fever, night-sweats may be suspected of having acute brucellosis. The fever may rise to 103-105°, but the patient may not appear so ill as in other fevers, especially typhoid. The incubation period varies from 10 to 40 days. The onset of symptoms is often gradual. In an intermittent form the fever periods may alternate with non-febrile conditions of approximately the same duration. Interpretative proof of these symptoms or conditions must come from the laboratory. As the disease progresses, the infection may localize in the liver, spleen, genital tract, with gastro-intestinal invasions; other symptoms may be anorexia, constipation, nausea, abdominal pain, endocarditis, and ocular diseases.

Even more difficult to diagnose may be the chronic aspects of this elusive malady. Previous attacks of undulant fever, or of "low-grade" fevers lasting months, mental depressions, together with sensitivity to the Brucella infection, are justifiable chronic possibilities. Bursitis, periarthritis and spondylitis, when corroborated with Roentgen and laboratory studies, may constitute a practicable diagnosis. Intra-cutaneous tests have now been so developed in purpose and procedure that they constitute a valuable aid in the diagnosis.

Laboratory diagnosis requires highly specialized training and scientific judgment in preparing and utilizing cultures for the recovery of Br. melitensis, Br. abortus, and Br. suis as dependable evidence of brucellosis. Agglutination tests have a separate value, even though the number of positive reactions obtainable with cutaneous tests is higher; the significance of this difference is unknown.

Guinea pig studies and experiments are resorted to because occasionally Brucella organisms may thus be recovered when cultures continue negative. Blood studies for secondary anemias developing in acute brucellosis may be undertaken, although in the majority of mild and chronic cases the blood appears normal.

Many research workers have compared undulant fever to typhoid fever because of the similarity of symptoms, namely fever, toxemia, leukopenia and splenomegaly, etc. The resemblance is apparent in acute brucellosis but in chronic brucellosis the symptoms may simulate those of many chronic conditions. Brucellosis must be differentiated from syphilis, tuleremia, rheumatic fever, endocarditis.

The prognosis is favorable in most cases. In the United States deaths occur at the present time in only 1% of the recognized cases. This low mortality rate is no index to the seriousness of the disease, because the morbidity from the prolonged disease course, especially in chronic brucellosis, is unusually great. Recovery may be assured the patient, especially if circulatory antibodies have developed. Relapses are more prone to occur in patients with mild symptoms at the onset than in those with a well defined acute form of disease.

In 1936 Drs. Carpenter and Boak reviewed the current therapeutic methods for brucellosis and felt that no dependable treatment was available. The treatment has been a perplexing problem to practicing physicians since the isolation and identification of its causative agent by Bruce. The fact that such a large number of remedies have been used in the past and that new ones are added to the list each year proclaims their ineffectiveness. Although the sulfonamide compounds have recently been added in treating acute brucellosis, the results are not yet conclusive.

We are, therefore, giving the results of five cases of our own, treated with a radioactive colloidal manganese product marketed under the trade name of Colmetanese.* This product was brought to our attention by Pennington (*Illinois Medical Journal*, August, 1933) in an article entitled "Carbuncle," in which he describes the medication as having "a wide range of usefulness; it is non-toxic in therapeutic doses and is a good hematonic."

Case Reports

CASE 1: O. McM. Male, colored, age 28. On May 18, 1943, he complained of constipation and headaches; on May 26, of chills and night-sweats; his temperature was 100° F. May 28, temperature was 102.6° F, and symptoms continued. Brucellosis was suspected and blood specimen was sent to laboratory for agglutination test which was positive in a titer of 1-640. He was given sulfathiazole 15 gr. at four-hour intervals until June 9 without any noticeable results. Treatment with Colmetanese was begun June 9 in dosages of 5 cc. intravenously twice weekly, supplemented with liver extract and yeast orally. He stated that he felt much improved and had no further chills or night-sweats after the first injection with Colmetanese. The temperature gradually returned to normal and remained normal after July 19, 1943. Treatment was continued for a period of 12 weeks although the patient returned to work 8/23/43 and has had no evidence of a recurrence.

CASE 2: J. R. Male, white, age 32. On 8/31/43 complained of chills, fever, loss of appetite and general weakness. Temperature 101° F, and pulse 128. Said he had been to his family physician, whose diagnosis was brucellosis and who referred him to us for treatment. Colmetanese 5 cc. was injected intravenously on 8/31/43 and ferrated liver concentrate and yeast were prescribed orally. On 9/7/43 his temperature and pulse were normal and have remained so ever since. The treatment of 5 cc. Colmetanese intravenously twice weekly was continued. The patient was given permission on 10/29/43 to return to work which he did on 11/1/43.

CASE 3: J. G. Male, colored, age 31. On September 28, 1943, complained of chills, fever and night-sweats for the past week. His temperature was 102.4° F. He was sent home and given 15 gr. sulfathiazole at four-hour intervals. He did not return for further observation or treatment until October 5, 1943, at which time he stated that he was not feeling any better and that during the two weeks of his illness he had lost 20 lbs. in weight. Brucellosis was suspected and blood specimen taken for agglutination test was positive in a titer of 1-640. The following day he was given 5 cc. Colmetanese intravenously with liver extract and yeast orally. The Colmetanese was repeated every second day for two weeks, and although the patient stated that he felt much better he still had night-sweats and a morning temperature ranging from 99° to 100° F. On October 18, the dosage of Colmetanese was increased to 10 cc. intravenously on alternate days. Nine days after this increase in dosage his temperature was normal and has remained so and there were no further night-sweats. The Colmetanese was then reduced to 5 cc. three times weekly, and the patient continues to feel exceptionally well with very good appetite and his weight increased by 10 lbs.

CASE 4: R. W. Male, colored, age 45. The patient went to Cook County Hospital, he was complaining of general body pains, chills and fever. A diagnosis of brucellosis was made and he was treated at the hospital for a month, after which time he was dismissed. On June 8 he was still suffering from marked weakness, loss of weight, poor appetite, nervousness and sleeplessness. Colmetanese injections were begun on June 8, 1943, and were given twice weekly with liver extract and yeast orally. On June 11 he said that he felt much better, and the treatment was continued for 12 weeks, his health continuing to improve.

*The Colmetanese used in this series of cases was furnished by Farnsworth Laboratories, Chicago.

CASE 5: The following case is from our Omaha plant: "The source of the infection in this case had not been determined, the closest guess being from unpasteurized milk. He first became ill on May 19, 1943, and was suffering from chills, fever, sweats, headache, loss of appetite and loss of weight (36 lbs.) up to August 11. His previous doctor hospitalized him for three days beginning June 1 and using sulfadiazine with no improvement. His fever, however, tending to recede by rest and plenty of sleep, but returning when being up and around and varying between 98.8 and 102°. We started the Colmetanese treatment of 5 cc. intravenously on August 19, every two to three days including September 24, giving 11 injections altogether, and after the first week his fever receded and remained at 98.8° at the highest at 6:00 P.M. daily. He was also placed on a daily requirement of mixed vitamins and lextron capsules, Lilly, tid. His appetite returned after the first week's treatment and his other symptoms have all disappeared with the exception of some weakness remaining but he is doing about seven hours of work daily and takes nine to 10 hours sleep daily. His weight has increased by 10 lbs. at the present time."

CONCLUSIONS: (1) Brucellosis in man has grown in prevalence in the United States from one case in 1905 to a serious public health problem today.

2. Its protean nature and multitude of symptoms make diagnosis very difficult, if not impossible in some instances. Valuable diagnostic procedures are the agglutination test, the intradermal test, cultural studies, white blood cell and differential counts, and opsonocytophagic tests.

3. The prevention of brucellosis in man depends on four factors: (a) pasteurization of milk and cream; (b) eradication of brucellosis in domestic animals, chiefly cattle and swine; (c) prophylactic vaccination of all persons coming in contact with either the cultures or with the disease in animals; and (d) public health education of animal husbandmen to the dangers from contact with infected animals, and of the general public to the danger of consuming raw milk and other unpasteurized dairy products.

4. Researchers have been unable to develop an effective treatment to date. Many forms of therapy, including general care, immunizing serums, vaccines, toxic filtrates, chemicals, and artificially induced fevers have been given careful study.

5. Our experience leads us to believe that Colmetanese opens up a new therapeutic approach to this grave problem. We have noted that in most of our patients there is a prompt response to treatment and a markedly improved clinical picture, including increase of appetite, reduction of fever, and cessation of morbidity, so that patients are able to resume their occupations in a much shorter time than has been experienced with any of the other methods of treatment we have used. We feel that this therapy has had a decidedly beneficial effect in all cases in which we have used it, and there have been no apparent toxic reactions or intolerances shown.

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Rhode Island Society

THE RHODE ISLAND SOCIETY OF INDUSTRIAL PHYSICIANS AND SURGEONS had its regular meeting at the Rhode Island Medical Library on November 16, 1943. The Rhode Island Industrial Nurses Club met at 8:00 o'clock and conducted its business meeting in the Rhode Island Medical Society Auditorium. The physicians and surgeons met in the Rhode Island Medical Library, where they conducted their business meeting. Following these business meetings the nurses and doctors joined for the evening's program.

The first speaker was MR. MORTIMER W. NEWTON, Chairman of the Rhode Island Unemployment Compensation Board, charged with the administration of the Cash Sickness Insurance Fund. MR. NEWTON explained the operation of the Cash Sickness Insurance Act and the procedure followed in processing claims. He assured his hearers of the desire of the Board to cooperate with physicians in adjudicating claims, and stated that if physicians will supply the Board complete details in doubtful cases the Board will extend benefits. He also stressed the fact that the Board members are not doctors and are guided only by the information supplied them on the blanks returned by the family physician coupled with the report of the Board's own physicians. Although an opportunity to be present at the hearings on appealed cases is offered to the family physician, only one physician has so far appeared at such hearings. Taking cognizance of recent editorial criticism in the *Rhode Island Medical Society Journal* anent the cutting off of benefits, MR. NEWTON stated that often such cases were due to failure to supply the Board with extensive details of the case. In every case the Board gives the patient the benefit of the doubt. He further claimed that the largest percentage of applicants are getting full benefit, that is, the total amount of payments under the law. Each employee insured contributes 1% up to $3000 income and can withdraw in sickness fund $18.00 a week for a maximum of 20 weeks.

In the discussion which followed, DR. CHARLES FARRELL, President of the Rhode Island Society, pointed out that, while no doubt some of the cases claiming extended benefits were malingering, by and large a greater number were functional disorders who could properly be classed as "sick people" and unsuited for gainful employment. These people were cut off if they had passed the number of weeks allowed by the Board's physicians for specific organic conditions. DR. FARRELL further stated that it is manifestly impossible under present conditions for physicians to take the time necessary to appear before the Board at the many hearings held to aid the patient in appealing from a decision of the Board's physicians or to write an extensive report regarding such disputed cases.

The second speaker was DR. STANLEY SPRAGUE, of Pawtucket, who is the industrial physician for the J. & P. Coates (R. I., Inc.) Co., and who spoke on the "Management of an Industrial Medical Department." DR. SPRAGUE gave a very thorough exposition of the ideal medical department set-up. He considered the architectural details as completely as the medical equipment. He advocated rubber-tiled flooring, pastel colored walls, sound-proof and enclosed examining rooms, separate toilets for men and women, white and black curtains for the windows, hot and cold running water, open plumbing, hospital beds, a stretcher, and the complete detailed medical equipment necessary adequately to care for the needs of the plant involved. He also insisted on first-aid training for nurses, and the prompt and courteous care of the patient on the first and every subsequent visit. His rules for equipping and managing a medical department brought forth no word of dispute or adverse comment from the doctors and nurses present.

The President reported on the recent acquisition of industrial books in the Library, and announced that the next meeting would be held at the Ashton Works of the Owens-Corning Fiberglas, where the combined industrial physicians and nurses will be given a personally conducted tour through the plant.

Men Who Made Industrial Medicine

—Appraisal of One Man's Place in Its History—

CASSIUS HINDS WATSON, M.D., F.A.C.S.

INDUSTRIAL MEDICINE is comparatively new in its professional recognition—comparatively, because the certificate of its acceptance as a special and important department of medicine is only about six years old, and there are still many practitioners whose interest in it remains tinged with the long habit of their reluctance. And it is even newer in its widespread adoption as a necessary department in the economics of productive enterprise, although the war effort has been eloquently persuasive in that direction. Likewise, it is yet so young in the general mind as to make it, every now and then, the substance of another "discovery"—as when some eager publicist happens to stumble upon it. But these are merely a few of the elements of its objective status. Subjectively, industrial medicine is veteran in years, seasoned in experience, strong in principles, sound and dependable in practice, insistent in the logic of its position in the husbandry of hiring, and indefatigable in its progress toward the vital and permanent place in the councils of management which is its destiny. This it owes to the men who made it—exemplars, each, of the pioneer spirit that built the nation and the soldier courage that fights to preserve its institutions.

There were not many of these men, in the years when some of those who are now in their afternoons began. Until 1910 there were only scores; in 1917 a hundred gathered in Washington at the behest of the medical direction of the first World War. Most of them have lived to see their places in the history of industrial medicine become clearly defined. Each has a place, because each made an individual contribution, compounded of opportunity and personal equation. The fact that there are now several thousand who are using the methods, extending the plans and being guided by the precepts which are the aggregate of these individual contributions is evidence enough of the integrity of the foundation the pioneers hewed out, and the quality of the structure they reared upon it.

CASSIUS WATSON'S place in the history of industrial medicine is peculiarly individualized by his personal characteristics. His opportunity with American Telephone & Telegraph demanded leadership in the science and techniques of medicine and surgery, and he rose to its full stature. His contributions as physician and surgeon, timely and effective in the circumstances of their applications, have become a fabric of fundamentals; his medical department is a pattern to follow, a model to emulate. These things in themselves would establish his rating as one of the "greats" in industrial medicine. But he gave much more, and what he gave derived from the fact that he is CASSIUS WATSON. Strong, sturdy, square and stern of jaw, with level eyes beneath a high broad brow, he attracts confidence, exudes dependability. This has been predominant throughout his long and successful career as one of the country's outstanding medical directors. Alone a tower of strength; in association with his fellows equally a tower of strength; his place in the aggregate that is now industrial medicine is the place of a main pillar, an "anchorman," an Atlas of the huge well-ordered cosmos he so ably helped to evolve. It is a big place, because he is a big man.

We can speak of him and his place in a combination of past and present because his place has become fixed while he is still young enough to build a second career; the conjunction of his company's retirement policy and the terms of the "lease of nature" have withdrawn him from the scenes of his first one. His retirement from A. T. & T. was announced as of October 1.

The preliminary, under corporate systems providing for retirement, is often either 20 to 30 years of continuous service or attained age 65. DR. WATSON has both. He was born in Brooklyn, September 13, 1878; and he was asked to organize the medical unit of A.T. & T.'s Employee Benefit Plan at the home office in 1913. He had graduated B.S. at the University of Pennsylvania in 1901, and M.D. at Long Island College of Medicine in 1905; had interned at Long Island College Hospital, 1905-07, and had engaged in general practice, with special interest in surgery, 1907-1913. His first industrial association was with New York Telephone Company in 1910. His absorbing interest in safety matters dates from this time; it was to take him to the presidency of National Safety Council in 1935, '36 and '37.

IN 1915 he relinquished his practice to become full-time medical director for A.T. & T., in charge of its medical matters, and adviser for the far-flung medical units of the Associated Bell Telephone Companies. One of his earliest and principal concerns in the building of his medical department was to have it equipped for diagnosis. As a result, his headquarters speedily became the site of the first complete diagnostic laboratory in industry; and for many years this has been so ably staffed and thoroughly equipped that there is nothing done in up-to-date diagnostic methods that isn't done, or can't be done, there. His purpose was two-fold: first, the essential values in the immediate situation; second, the usefulness to the employee's personal physician. He was a pioneer, indeed, for, at the time he began, industry had not yet

learned to look behind the instant emergency of its sick or disabled employee, and the thought that the trouble of the moment might have had a past and could have a future of industrial significance was almost startlingly new. The employer's interest began and ended with the employee's working hours, and the whole idea of employer responsibility was bounded by the extent to which the company might be liable for whatever happened to him during that time. This man's philosophy, however, went much deeper; from the very start of his industrial medical career—even though there was then what seemed an inexhaustible pool of labor from which to draw replacements—it has been his urge to restore the sick or disabled worker to his job. This was not in anticipation of the coming of workmen's compensation—which was already beginning to aim at the same thing from the standpoint of the cost of the employee's being idle. It was a long-range pre-vision of the modern concept of the employee as an individual economic unit, dependent upon his place to work, his right to work, and his health to work, in order to sustain his relation to the life of the community in which he has his being. Nor was this a dream, for this man was not a dreamer. It was the practical foresight of a mind big enough to sense, long before they became apparent, the influences of a teeming urban population and a more complicated way of life upon the inter-relations of individuals to each other. "Who's Who in Industrial Medicine" says of CASSIUS WATSON that he is "distinguished for his accomplishments in the development of, and emphasis upon, diagnostic work in industrial medicine and surgery." The elaboration here is a part of this picture, for, being himself, he could not have viewed the subject of the nearest-to-possible perfection in diagnosis in any other light than as fundamental in the practice of sound industrial medicine and surgery.

The management of a medical department involving hundreds of thousands of employees must inevitably require administrative talent as well as medical and surgical proficiency. Here this man excelled. His record as an administrator is one that might well be the envy of many a corporation president. But his excellence in this respect was not allowed to inhibit his professional interests. He was ever abreast of the newer technical knowledge, and constantly informed of medical and surgical developments—fostering them assiduously if they held promise of improvements in his own methods—while at the same time keeping himself so close to the heart of his work that he became, and long has been, one of industrial medicine's best examples of a capable physician and surgeon who could be also a capable administrator without losing the clinical touch. Indeed, the professional and executive abilities seemed so mixed in him that each was enhanced with added skill in the other. This, by the way, is not unusual in a man who possesses the qualities to be a good surgeon.

EXPRESSIVE of his interest in the personalities and techniques of his field was his quick and continued collaboration with his fellows in industrial medicine. In the early days there were hardly two who had the same problems, so great was the diversity of the environments in which they worked. Yet all found a common denominator in the fact tha their problems were industrially medical and surgical, and this drew them together in a number or organizations. First was Magnus Alexander's Conference Board of Physicians in Industry in 1914; next the American Association of Industrial Physicians and Surgeons in 1915. DR. WATSON was present at the organization meeting of the latter, but was not among the hundred who assembled in Washington for the war effort in 1917, as he was already in the Student Army Training Corps at that time. Some years later there was the New York State Society of Industrial Medicine. He was one of the initiating group and a charter member of each of these organizations as it came along, and he freely identified himself with its objects and purposes, its meetings, and its official personnel. In this kind of contact he learned much, and—as his own abilities and the background of the position in which he was using them so well grew side by side—he gave more. He gave of his time, his knowledge and his talents so liberally that he has been president, director, committee chairman and member, and presiding officer in these associations and their meetings more times than he can remember. And for many years his name and presence have meant so much in these respects that a program which included him in any capacity obtained thereby an evidence of substantiality and solid worth that was never disappointing in the performance. He has always been particularly interested in the A.A.I.P. & S.; in its affairs, he was ever—as he would be to any movement in which he believed or, for that matter, to any person in whom he believed—a veritable bulwark of dependability. His terms of office as president and director of that association came at times when the positions were weighted with much more work than honor; but characteristically, he took them in stride, making sure of the soundness and permanency of the work, and letting the honor look out for itself. Those who chose him knew whom they chose. It seems strange, now, to recall that the A.A.I.P. & S. had its days of struggle, misunderstanding and lack of support. But it lived through plenty of them, and the fact that it did so is to the everlasting credit of the faithful few, among whom CASSIUS WATSON, of American Telephone & Telegraph, and LOYAL SHOUDY, of Bethlehem Steel, were the always reliable nucleus of rock-ribbed confidence in its future.

Withal DR. WATSON has found time for his medical associations, including the Medical Society of the State of New York, the New York Academy of Medicine, and the National Tuberculosis Association; as well as the National Safety Council (where he was Vice-President for Health, 1932-35; President, 1935-37; Director, 1931-42; member of the Executive Committee since 1931; and member at various times of the Advisory Committee for Aeronautics and the Public Safety Advisory Committee); the American Red Cross (in which he has long taken an active interest); and the Committee on Prevention of Silicosis Through Medical Control, established by the U. S. Secretary of Labor, 1936. He has been a member of the New York City Park Commission; trustee of the Neurological Institute of New York; Director at Stony Wold Sanitorium, Lake Kushaqua, New York; on the staff of New York's Beekman Street Hospital. He is also a trustee of Long Island College of Medicine, his medical *alma mater;* and, with DR. J. J. WITTMER, likewise an alumnus, he was a prime mover in the establishment of that College's Post-Graduate Course in Industrial Medicine, which has now just finished its second brilliant demonstration of the usefulness and timely value of such a means of education.

Much more could be said about this man—but in the saying nothing could be set forth that would bring more glory to him than he has brought upon himself, nor by added words would his place in the history of his field and the period of its most significant and important developments be any more firmly fixed. CASSIUS WATSON will ever remain the stalwart pioneer of clinical medicine and surgery in industry, and the model administrator of its tenets.

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MEMBERS of the AMERICAN ASSOCIATION OF INDUSTRIAL PHYSICIANS AND SURGEONS who are being discharged from the Armed Forces and who desire to relocate in industrial medical work are invited to communicate with DR. EDWARD C. HOLMBLAD, Managing Director of the Association. DR. HOLMBLAD is in close contact with the opportunities for such relocation. His address is 28 E. Jackson Blvd., Chicago 4.

Education in the Use of Solvents

ON PAGE 821, herein, will be found an analysis of carbon tetrachloride cases that have appeared in the medical literature. This is the second installment in the series of case studies by Safety Research Institute, the benzol literature study having been published in November.

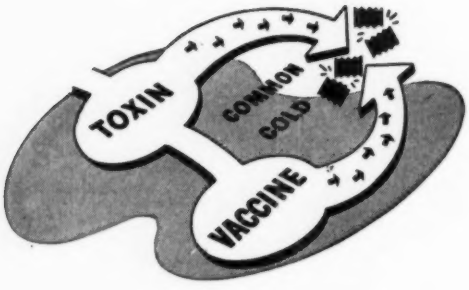
Scrutiny of these cases reveals that there is a great need for wider education in the proper use of solvents. Most of the serious cases, and many not serious enough to involve time lost from the job, appear to have occurred in small, unsupervised operations where the importance of ventilation was either unknown or ignored. Under such circumstances, it is probable that any volatile solvent would have caused similar results.

The need for such education is especially apparent now, when many new users are employing toxic substances for the first time and when the industrial hygienist is confronted with new problems. The hazards of carbon tetrachloride have been so widely publicized that evidence of its improper use is likely to be easily recognized. Unfortunately, the same does not hold true for all the solvents, particularly the more recent ones. In fact, it is sometimes said that whenever one of the older solvents, such as carbon tetrachloride, is a possible factor, other potential but less well-known causes of distress may be overlooked.

There is a distinction, however, between *education* and *alarmism*. Cases that have resulted from improper applications, such as the use of carbon tetrachloride for its soporific effects, are cited in the literature as evidence of its hazards. Discussions of such cases in the medical literaure are of value in describing effective medication to others who may be confronted with similar problems. But using such instances as warnings against the products concerned is like campaigning against the use of automobiles because careless drivers cause accidents.

Statistics

THERE'S a nice comment in *J.A.M.A.* for November 20, on "Guessing at Physician's Incomes." It well suggests the weird ways in which statistical figures nowadays are being evolved. A total of questionnaire returns from about 1% of the physicians listed in the 1942 A.M.A. directory was examined; a hundred or more were removed on account of "a strong bias," the remainder were "weighted" to compensate for certain special difficulties apparent, and the result was the U. S. Department of Commerce statement that "the average gross income reported for 1941 was $8,524, and the average net income $5,047." Possibly these *could* have been the averages for the 1898 physicians who "reported," i.e., who returned the questionnaires that were used. Soon, however, for one or another of the purposes for which statistics are employed, the sentence will be quoted with the incomes unqualified by the "reported." The Department of Commerce has been rather on the reliable side in its public presentations, so it may not be fair to suggest that this invitation to the unqualified quote was intentional. But not so much can be said for certain other departments and agencies; nor for the numerous surveys of public opinion sampling the public from time to time. Several of the latter have developed to fine propaganda effectiveness the art of expanding a tiny "cross-section" into a total picture; they are expert at making a country-wide percentage out of a street corner interview with a pedestrian halted at a traffic light. But this expansion process seems to be only one way of figuring. There are others. One of the others came to light at a recent meeting of state and Federal committeemen interested in various forms of insurance. An official asserted that the total damage from a certain kind of fire throughout the year had been 90 millions. A state officer argued that this figure was much too high, because the carefully compiled reports for his own state showed only a little over one million, and, as his state had 5 or 6% of the national potentiality for such fires, the total couldn't be more than about 25 million. The meeting decided the ensuing argument by *voting* on the amount, and the 90 million won. Thus a statistic came into being—a full grown fact springing, Minerva-like, from the forehead of the majority opinion. And so there are ways and ways of developing statistics. That one by which it is shown that the cost of living is up so little must be a dandy—to say nothing of the way in which the so-called "patient-load" per physician was decided on, or, perhaps also, the way in which it was discovered that there is such an overwhelming need for the "medical care" about which the social planners are so solicitous.



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An Industrial Medical Department

—Organization and Administration—

M. H. MANSON, M.D., F.A.C.S.,
Medical Director,
American Telephone & Telegraph Company,
New York

AS A PRELIMINARY to any discussion of details on this subject I should like, if possible, to clarify by definition, the question "What is an Industrial Physician?"

Perhaps the most compact and concrete definition is the one formulated by the Conference Board of Physicians in Industry, as far back as 1922: "The physician in industry is one who applies the principles of modern medicine and surgery to the industrial worker, sick or well, supplementing the remedial agencies of medicine by the sound application of hygiene, sanitation, and accident prevention; and who in addition has an adequate and cooperative appreciation of the social, economic, and administrative problems and responsibilities of industry in its relation to society."

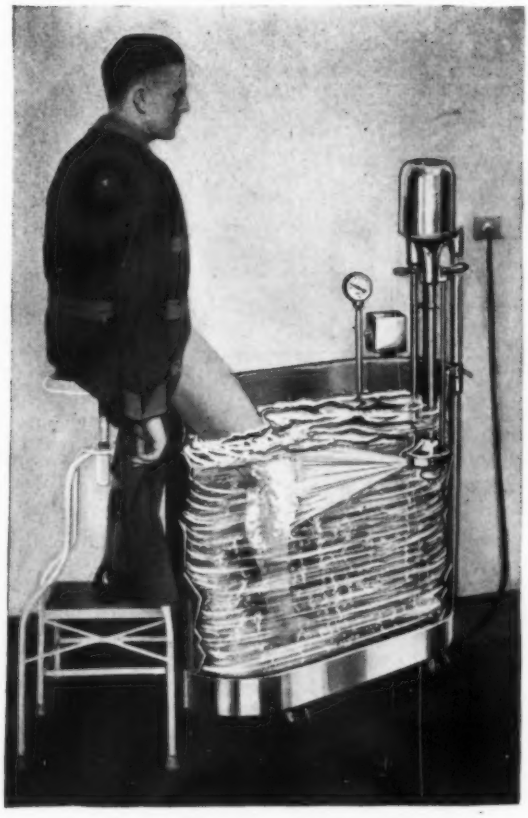
This definition, if analyzed, will be found to be very comprehensive; it has withstood the test of the several years which have passed since its formulation. It obviously excludes a fairly large number of physicians with a practice that includes industrial cases, and also unfortunately excludes a large number of physicians giving part-time service to small industrial plants. One reason for this is the fact that such a doctor fulfills the definition only up to the word "sick," i.e., he "applies the principles of modern medicine and surgery to the industrial worker, sick——," and, because of a lack of opportunity, or time, or inclination, neglects the remaining important considerations.

Theoretically, the individual possessing high qualifications may, with advantage to the industry, the employees, and himself, perform extensive and praiseworthy services on a part-time basis, going to each establishment one or more hours a day, holding himself in readiness for the unusual emergency, sending out to the family physicians those cases not properly within the scope of industrial medicine, ferreting out the unsafe and disease-producing aspects of the work, systematizing the compensation situation, etc. Practically, however, this theoretically sound procedure may not function to the advantage of anyone. Small plants are prone to operate under the domination of small ideas. Low salaries are usually paid to physicians, and unsatisfactory medical quarters provided. The physician is, more often than not, unqualified. Routine care of minor injuries attracts an undue interest at the expense of constructive activities aimed at prevention of accidents, health education, and improved working conditions. The next speaker will, I believe, elaborate upon the problems of the small and medium-sized plant and so, without dwelling further upon the qualifications of a physician in industry, or the objectives, I should like to sketch the organization of an industrial medical department from a physical standpoint.

Location

THE LOCATION of the medical department should be as central as possible, either vertically or horizontally, depending upon the layout of the industrial premises. In our particular instance, in a 30-story building the medical department is located on the fifteenth floor. If the premises are built on a horizontal scheme it may be necessary and desirable to have facil-

The text of DR. MANSON'S Lecture at Long Island College of Medicine's Post-Graduate Course in Industrial Medicine, November 1, 1943.



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ities near the employment entrance for pre-placement examinations set aside separately from the rest of the medical facilities. Again, in some of the large horizontally built plants such as have sprung up recently for the manufacture of materials of war, it may be necessary to have a number of subsidiary first aid facilities in addition to the most centrally located headquarters portion of the medical department.

The subsidiary first aid facilities should each have a nurse on duty who may then refer the more serious injuries to the central medical department or call the physician in an emergency. Ordinarily the doctor should make regular scheduled visits to all sub-stations, in order to give personal attention to the more seriously injured and for purposes of general supervision.

Space and Equipment

THE most common arrangement in the smaller industrial establishment is the one-room dispensary which serves as a combined waiting room and examination and treatment room, recovery room, and record department. While this one-room dispensary may be the cheapest to provide and equip, it does not offer the most satisfactory working arrangement. A minimum of three rooms, consisting of a waiting room, a treatment room, and a room for consultation or for making physical examinations, is desirable. Rooms for special purposes can be added, according to the needs and size of the company. The waiting room need not be very large if the return visits are distributed throughout the day so as to prevent congestion and unnecessary loss of time. Applicants for employment waiting for pre-placement examination should be separated from the first aid rooms or wherever the injured employees are cared for. It is a common practice, and probably justifiably so in many industries, to provide a surgical treatment room which is large enough to treat more than one employee at a time. However, when practicable, I believe an effort should be made when planning the layout of a medical department to keep away, as much as possible, from a clinic atmosphere, and to develop an atmosphere approaching that which is obtained in private practice with individual attention and treatment. I am not going to spend any time or detailed equipment such as sterilizers, cabinets, locker space, desks, etc., but I should like to venture the opinion that each medical department should have diagnostic facilities for clinical laboratory and x-ray studies, as complete as possible. The extent of this equipment again will vary somewhat according to the nature of the industrial operations. Most of the medical departments in the chemical industry, for example, have very complete facilities for laboratory examinations because of the larger number of chemical and toxicological hazards.

Recovery cots or beds should be provided for each sex, properly screened and segregated and, if the number of female employees is large, consideration may be given to a separate waiting, examining, and treatment room. Adequate rest-room accommodations should be provided for female workers. In some states this requirement is specifically and proportionately designated. Convenient toilet facilities should be provided for each sex. This simple statement would seem to be an obvious fact but, aside from medical department considerations, this question has assumed major proportions in many industries, such as aviation and shipbuilding, which now have a large proportion of women where formerly they were not employed.

I have enclosed in the notes at this point a memorandum which was prepared about two years ago, containing some detailed consideration for the planning of a medical office to serve 1500 employees. I should like it clearly understood that this has been given very arbitrary treatment for use as a model and is not necessarily specific in recommendations as to estimates and figures. Furthermore the cost is undoubtedly entirely out of line with present-day conditions.

Details for 1,500 Employees

THE following memorandum provides information relative to the amount of floor space, equipment and operating costs, which is presented for consideration in connection with planning a medical office for approximately 1500 employees. These 1500 employees will be considered as potential users of the medical office facilities, and the unit will be planned to handle examination of applicants and employees, and emergency treatments in sickness and accident cases.

Using this figure as a basis, and the estimate that 2% of the potential users of the medical office facilities will visit the medical office each working day to receive some form of medical attention, about 30 cases per day, or 150 cases per five-day week, can be considered as the possible amout of work which may be handled in the proposed medical office.

The expected number of visits to the medical office being estimated, the following details in connection with its planning can be closely approximated:

1. Professional and non-professional personnel, with estimated salaries and wages.
2. Floor space, with estimated cost of rent and house service.
3. Cost of equipment, supplies and other expenses.
4. Operating costs.

PERSONNEL AND SALARIES: It has been estimated for this example that a doctor can handle an average of approximately four miscellaneous medical office visits per hour, or 28 cases per seven-hour day, or 140 cases per five-day week. It is also estimated that about 60% of all cases visiting the medical office will possibly receive the attention of a doctor, and the remaining 40% will need only simple first aid attention by a nurse. If the amount of work which it is anticipated the doctor will handle per week amounts to 60% of 150 potential cases, it will be possible to consider that 90 cases per week, or 18 cases per day, will require the services of one part-time doctor, working four hours per day.

(20 doctor hours @ $5.00 per hour = $100.00 per week.)

It has been estimated for this example that one nurse will be able to take care of about six cases per hour, or 42 cases per seven-hour day, or 210 cases per five-day week. If the nurse assists the doctor in all of the estimated 90 cases he may attend during each week, the remaining time left to the nurse will be more than sufficient for her to handle the 60 emergency cases requiring simple first aid attention. Such extra time as the nurse may have could be used to keep the rooms and equipment of the medical office in proper order.

(1 nurse, full-time—$32.50 per week— Starting rate.)

Most medical offices employ one or more clerks to handle the non-professional detail work of the office, if the size of the unit and the amount of work done warrant it, in order to use the full professional time of the doctors and nurses. Assuming, in this instance, that a clerk will be necessary, because the nurse would not have enough free time regularly to take care of routine non-professional work, a clerk's salary may be included.

(1 clerk—$24.00 per week.)

In connection with maintaining a medical office, it is generally assumed that some administrative salary

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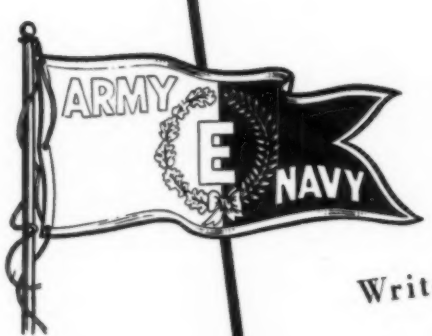

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expense of persons not located in the medical office will need to be added to the salary expense shown below to cover the cost of supervising non-professional matters. The proper portion of such administrative expense differs in each instance and, because of that fact, no such amount is directly included in this example.

(1 doctor—$100.00 per week; 1 nurse—$32.00 per week; 1 clerk—$24.00 per week. Total $156.00 per week, or $8,112.00 per year.)

It should be considered that any salary figures shown here as possible starting rates are hypothetical and will vary according to conditions and localities. Substitution of actual figures would, of course, produce accurate salary expense.

FLOOR SPACE, RENT AND HOUSE SERVICE: The amount of medical office floor space which would be sufficient to handle the expected visits of 1,500 potential users can be estimated when the number of visits and the personnel to handle these visits have been determined. It should be realized, of course, that this estimated figure may vary somewhat from that used in actual layout of floor space because of the location of windows, columns and other details in building construction which seldom lend themselves to any standard medical office layout. Suggested floor space may be planned in the following manner:

(a) RECEPTION ROOM: The reception or waiting room generally is the most commodious room in the layout. It is usually provided with tables for magazines, comfortable chairs, floor and table lamps and any other suitable appointments to make the room a pleasant one in which the employee awaits medical attention. Desk and file space may also be provided in this room for administration of non-professional details in connection with the operation of the medical office.

It has been estimated that approximately 30 visits from employees for medical attention may be expected each day and, on the basis of a seven-hour work day, between four to six cases per hour may be handled by the doctor and nurse. If the number of employees visiting the medical office could be controlled by definite appointments, approximately five visits per hour might be depended upon and the amount of floor space for the reception room figured on this basis. However, as emergency visits make up a large portion of the total visits each day for which no appointments can be scheduled, suitable provision must be made for peak loads in the number of waiting persons in the reception room. These peak loads cannot easily be determined, but, from past experience, it has been generally found that the normal number of visits expected in one hour may be considered as the peak load. Hence in these plans five employees will be considered as waiting in the reception room at one time.

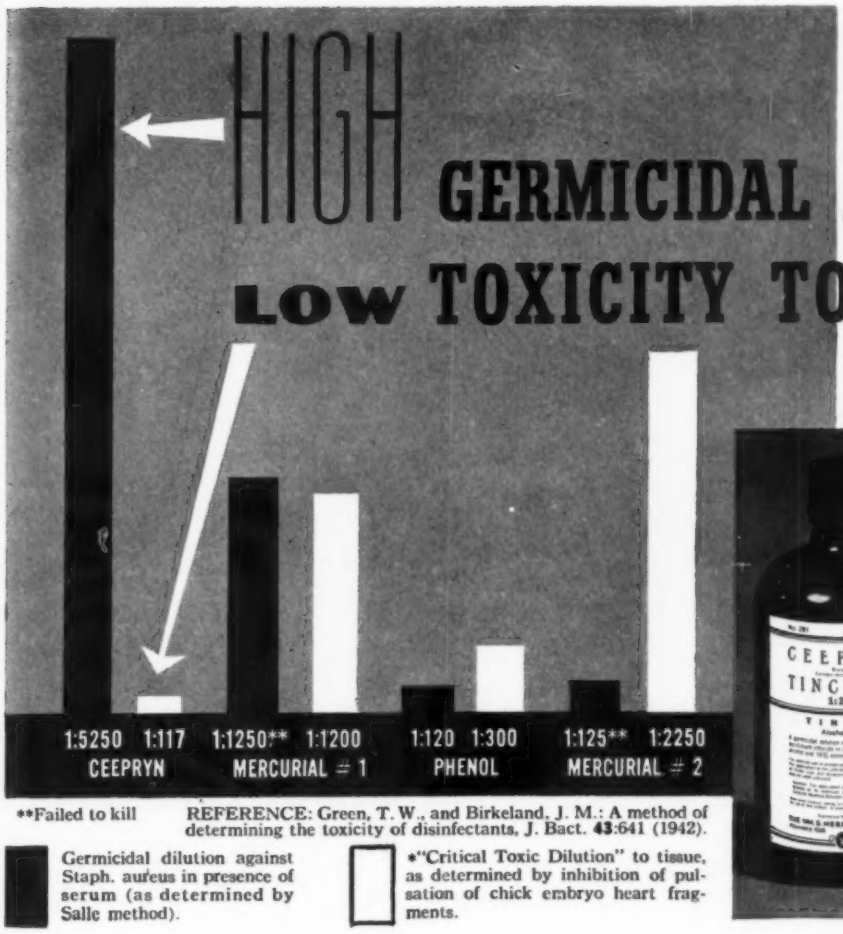
Experience has indicated that about 30 square feet of floor space may be used as a unit of accommodation for one person in the reception room. Multiplying this figure by the estimated number of employees who might be waiting at one time will give the approximate amount of floor space in the reception room to be devoted to employees awaiting their turn to see a doctor or nurse.

(30 x 5 = 150 sq. ft.)

Additional floor space should be provided in the reception room for desks, chairs and files of the clerical force. One clerk, with equipment, should be provided with about 100 square feet of floor space.

(100 x 1 = 100 sq. ft.)

The number of square feet allowed for waiting employees, added to the amount estimated as necessary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for clerical work, will give the total number of square feet required for the reception room.

(150 sq. ft. + 100 sq. ft. = 250 sq. ft.)

(b) DOCTOR'S OFFICE: It has been customary in medical office planning to provide satisfactory office space for the doctor, in order that he may properly supervise the professional services of the medical department. Where it is desirable, this room may be equipped for physical examinations, in addition to having a suitable desk and desk equipment for the doctor's use, and may be located adjacent to the reception room. This room should have approximately 125 square feet of floor space.

(125 x 1 = 125 sq. ft.)

(c) FIRST AID AND EXAMINING ROOMS: The trend in medical office planning has been to provide privacy for each employee when receiving medical attention by having a sufficient number of rooms to insure only one case being handled by a doctor or nurse at one time in any of these rooms. Experience has shown that in order to facilitate the handling of as many cases as possible, it is considered good practice to equip each room for both examinations and first aid treatments, in order that the doctors will not have to wait for a particular room. Each of these rooms should have not less than 100 square feet and not more than 125 square feet of floor space under normal conditions. The latter figure will be used for this example.

In the past, it has been the general practice to estimate that four to six first aid cases, or two to four examinations, may be handled per hour per room. Therefore, it is suggested that, when these rooms are equipped for both first aid and examinations, two to six cases per hour per room may be used to derive an average upon which to base the number of such rooms required in the medical office. This number may be determined by using the estimated number of cases to be handled per hour per room and dividing this number into the total number of cases expected per hour in the medical office.

It is assumed that approximately five cases per hour may be expected from the 1,500 potential users of the medical office who will require some form of medical attention. If it is considered possible that one room may accommodate about four cases per hour, two rooms should provide flexibility and allow sufficient facilities to care for the cases of sickness, accidents, and examinations visiting this unit.

(125 x 2 = 250 sq. ft.)

(d) LABORATORY: Although the amount of floor space required for a laboratory would depend largely upon the type of work to be performed, experience has indicated that approximately 100 square feet would be adequate should only laboratory work in connection with urinalysis be done. Should, however, hematology and bacteriology, except Wassermann, be included, the floor space should probably be increased to provide some 150 to 175 square feet. For this example 100 square feet will be considered adequate for the laboratory.

(e) QUIET ROOM: In considering the floor space for a quiet room which may be used in connection with a medical unit where indisposed women employees may lie down for a while and later return to duty, experience has indicated that 50 to 60 square feet would be satisfactory to use as a unit for one day bed. Assuming need for four beds:

(4 x 50 = 200 sq. ft.)

(f) NURSE'S LOCKER AND SUPPLY ROOM: A room about 100 square feet should be adequate to accommodate locker space for the nurse and also sufficient space for the storage of supplies used in the medical office.

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*Jonas, A. D.. Creosote Burns, Jl. Indus. Hyg. & Tox., Vol. 25, (Nov.) 1943.
**Gay, E. C.: Treatment of Burns, Mil. Surg., 91:298, (Sept.) 1942.
***Jarzynka, F. J.: Magnesium in Industry, Indus. Med., 12:427-431, (July) 1943.

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The arrangement of rooms and general facilities must depend naturally upon the window spacing, exits, elevators, light, ventilation, toilets and plumbing. Ordinarily these factors are permanent in a building, and medical office space would have to be planned to fit conditions. Hence, with the estimate of floor space for each of the activities given, some allowance of extra square feet will be required as a contingency for corridors, etc., in order to make a pleasant and efficient layout. Adding together the figures which have been suggested as adequate, it will be possible to obtain the total number of square feet of floor space for a medical office serving approximately 1,500 persons.

	Square Feet
1 Reception Room	250
1 Doctor Office	125
2 First Aid and Examining Rooms	250
1 Laboratory	100
1 Quiet Room	200
1 Nurse's Locker and Supply Room	100
Total	1025
Added for contingencies	125
Total	1150

The cost of floor space varies in different localities, hence, for this example, an estimated rent and house service charge of $2.50 per square foot per year will be used. Substitution of actual figures would, of course, establish an accurate cost of floor space per year.

(1150 sq. ft. @ $2.50 per sq. ft. = $2,875)

COST OF EQUIPMENT, SUPPLIES AND OTHER EXPENSES: Equipment costs incurred in furnishing all rooms of a medical office will vary considerably. The following figures are representive of what the expense per room may be, together with a total average cost:

1 Reception Room	$ 800	$1,200
1 Doctor's Office	400	500
(If equipped with examination room, add $200 — $300)		
2 First Aid and Examining Rooms	400	600
1 Laboratory	400	600
1 Burse's Locker and Supply Room	100	
1 Quiet Room	200	300
Total Cost (average)	$3,550	

The following detailed list of general furnishings, apparatus or equipment, and supplies for each first aid treatment room may be considered as a suggestion of what may be required when preparing these rooms for service. (See below.)

Past experience has indicated that the cost of the supplies used in connection with the work of a medical office amounts to an average of approximately 2½ cents for each visit of persons using the facilities of the medical office.

In connection with the operation of every medical office, there are expenses of a miscellaneous nature which may be termed "other expenses" and which cover furniture and equipment, repairs and replacements; postage, printing and stationery; telephone expense; periodicals and books; magazines. Any estimate of the amount of these expenses will, of course, be arbitrary, as they will vary with each medical office. However, as some approximate figure is necessary to complete the example in this memorandum, the past experience of a number of medical offices would seem to indicate that each case visit entails a cost of about 25 cents in miscellaneous expenses which could come under the heading of "other expenses."

OPERATING COSTS: The total yearly cost of a medical office is made up of all expenses incident to its operation and maintenance and includes salaries and wages, rent and house service, medical supplies and miscellaneous other expenses. The operating cost of the medical office used in the example of this memorandum is only suggestive of a basis upon which the expenses probably would be experienced in actual operation, and to adjust for this possibility an amount equal to 10% of the total expense will be added for consideration.

TOTAL OPERATING COSTS PER YEAR

Salaries and Wages	$ 8,112
Rent and House Service	2,875
Medical Supplies (7,800 visits per yr. @ $.025 per visit)	195
Other Expenses (7,800 visits per yd. @ $.25 per visitI	1,950
Total	$13,132
Add 10% for contingencies	1,313
Total yearly cost	$14,445

Using 7,800 visits per year as estimated for the medical office in the memorandum, this amounts to $1.82 per visit.

Based on studies by the National Industrial Conference Board, the American College of Surgeons, and the National Association of Manufacturers,* the average cost of a medical program, exclusive of compensation and the safety program, ranges from $5.00 to $10.00 a year per employee. The cost will vary with

*Bibliography for the above references:

1. The Medical and Health Programs in Industry. Studies in Personnel Policy, No. 17. National Industrial Conference Board, New York, 1939.

2. Medical Service in Industry and Workmen's Compensation Laws. American College of Surgeons, Chicago, 1938.

3. National Association of Manufacturers, Committee on Healthful Working Conditions; Industrial Health Practices—The Report of a Survey of Two Thousand Sixty-Four Industrial Establishments. National Association of Manufacturers, New York, 1941.

These references are a "must" on the reading list of anyone interested in this subject.

GENERAL FURNISHINGS

Number	Name of Article	Size	Approximate Cost (1941)
1	High-back chair, with revolving seat	Back 25 in. high	$15.00
2	Stools, revolving seats		11.00
1	Examining table	32 in. high; 20 in. x 72 in.	28.00
1	Examining-table pad	1 in. thick "Air-foam" rubber	23.00
1	Mirror	16 in. x 20 in.	11.00
1	Glass shelf and brackets (to be placed over lavatory)	25 in. x 5 in.	2.00
1	Wastebasket, half round (to be mounted on wall near lavatory)		2.00
1	Paper towel holder, complete with 175 paper towels	6 in. x 7 in. x 14 in.	2.00
1	Desk table, glass top, with four drawers right side and guard rail on top at back extending part-way on sides	20 in. x 36 in.	40.00
1	Waste stand, with square paper bag support		5.00
1	Instrument table	18 in. x 33 in.	22.00
1	Instrument and medicine cabinet (upper section with glass panels and glass panel door)	20 in. x 16 in. x 60 in. high (approx.)	75.00
1	Sterilizer for instruments without stand, electric	10½ in. x 5 in. x 3¾ in.	45.00
1	Physician's heater, complete with six De Vilbiss bottles		18.00
1	Scale, Fairbanks, beam with measuring rod	Cat. No. 1265	30.00

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★ Brucellosis in packing house employees must be considered an occupational disease in the opinion of Hardy.

★ Brucellosis now has been recognized as an important public health problem in this country, according to Carpenter.

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the size of the plant, being greater in the smaller plant than in the large industry. It also varies with the type of industry, being highest in the mining and lumber industries and lowest in food and kindred products and in shipbuilding and other constructions. Chemical industry occupies an intermediate position.

Difference in costs in the preceding example and the estimates mentioned in the above paragraph can partially be explained by lack of any estimated cost for laboratory and x-ray work and there having been no consideration given to outside consultation cost. Furthermore there has not been included the cost of any form of a health education program which, of course, is a necessary part of any medical department activities.

THE size of an industrial medical staff depends upon the number of employees, location of industrial operations, nature of industrial operations and scope or extent of the health maintenance program.

Because of these variable factors each industrial organization must be considered according to its own needs. It is the opinion of a number of industrial physicians, however, that industries without any great degree of occupational disease hazards but whose health service includes periodic health examinations could be served by regular plant staffs on the following approximate numerical basis:

No. of Employees	Doctors	Nurses	Technicians Lab. & X-ray	Clerks
250 or less	1 part-time or on call	1 part-time		
250 to 1000	1 part-time	1 full-time		
1000 to 2500	1 full-time	1 or 2 full-time	1 nurse technician	1
2500 to 5000	2 full-time or 1 full time 2 part-time	5 (4 in plant, 1 visiting nurse)	1 technician	1 to 2

In the chapter on Nursing Services, in the recently published Manual of Industrial Hygiene, edited by William M. Gafafer, and issued under the auspices of the Committee on Industrial Medicine of the Division of Medical Sciences of the National Research Council, it is recommended that there be one nurse for up to 300 employees, two or more nurses for up to 600 employees, three or more nurses for up to 1000 employees, and one nurse for each additional 1000 employees up to 5000, with one more nurse per additional 2000 employees. Additional nurses may be required because of hazards and to supply service for second and third shifts. This number will be reduced by the number of technical and non-professional workers in the medical department. During the war emergency it is essential that careful consideration be given to the utilization of non-professional clinic assistants under supervision of a nurse to keep at a minimum the number of nurses needed, and that the activities of the nurse be limited to essential nursing functions.

It might be worth noting that there are many persons both lay and medical interested in industrial medical work who are of the opinion that there should be no more than one, or two at the most, full-time physicians on the staff irrespective of the size of the organization. The reasoning behind this is based upon the fact that it is a lamentable fact, but true, that a full-time physician in industry without executive or administrative responsibilities is very prone to get himself into a rut, let his scientific interest slide, and neglect to keep apace with things medical and surgical. There is apparently an absence of the stimuli which are necessary in order to keep growing.

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Consultants

THE decision concerning when to call in a consultant and whom to call should be motivated by what is for the best interests of the patient. The physician who attempts to spread his professional capabilities too far is almost certain to come to grief, and the business executive who encourages such actions under the guise of economy is likely to regret it. Perhaps the consultant most frequently used is the surgeon, including the various specialists in the fields of neurological and orthopedic and other special branches of surgery. In all surgical cases where there is a question as to the accuracy of diagnosis or the adequacy of treatment, consultation should be called early, regardless of the reputation of the surgeon in charge. Perhaps second in importance from the standpoint of frequency of consultations are ophthalmologists. Internists are frequently invaluable in assisting in the differentiation between occupational and non-occupational disease, and in many instances it is advantageous for the industrial medical department to pay the expense of a consultation to assist the family physician in cases of difficult diagnosis or prolonged absenteeism. Dermatologists are consulted with increasing frequency. The presence of neurologists or psychiatrists on the consulting staff is also a necessity and seems to be increasingly so. Where specialists are frequently utilized they should be given recognition as members of the consulting staff.

Administration

NOW, as to the actual administration of the medical department there are two schools of thought, both of which deserve a hearing. In all medical services there are essentials of a non-professional administrative nature which sometimes assume considerable volume, and it is upon this point that there are differences of opinion with respect to organization. No one, of course, will argue that the strictly professional work should be done by other than a physician.

The administrative work of a medical department might be listed as follows:

1. General supervision of the entire personnel of the medical department in all matters except those of a professional medical nature.
2. Dissemination of routine medical findings among the several departments, keeping in mind, of course, the confidential character of the majority of these findings.
3. Acquainting the members of the supervisory forces with the fact that they have a substantial degree of responsibility for the health of the employees under them, and cooperating with them in assuring the most effective use of the facilities provided.
4. The selection, employment, instruction, and supervision of the personnel of the medical department—this to be done in conjunction with the medical officer or medical director for the professional personnel.
5. Engineering of the medical offices, including floor plans and equipment.
6. Standardizing and systematizing medical activities in conjunction with professional personnel.
7. Responsibility for the preparation of medical department wage schedules and for their application.
8. Cooperation with the professional personnel in all professional or semi-professional matters with the coordination and handling of which the lay members can assist.
9. Responsibility for the application of the company's general rules, regulations, and policies by the entire medical personnel.

There are those who argue that such administrative function should be under the direction of a lay person, thus theoretically relieving the medical man of these duties and allowing his entire time to be devoted to matters of a strictly professional nature. Further arguments in favor of having a lay person direct the administrative side of a medical department are:

1. The difficulty of securing medical directors with training, experience, and other qualifications for exercising administrative function, especially in connection with personnel work.
2. Where medical directors through long experience become familiar with administrative matters and proper organization procedure, the replacement is more difficult and less flexible than it would be if professional and personal qualifications only were necessary.
3. Where medical directors are in charge of administrative matters it may be necessary to adapt the business organization to the individual ideas of the physician whose training and experience, in most cases, has been exclusively along professional lines. This may lead to the disadvantage of building the organization around the man rather than the man adapting himself to the organization in accordance with methods and practices which have been in existence for some time.
4. If physicians whose salaries are, or should be, relatively high were required to give their attention to administrative and routine matters in addition to the professional duties connected with the medical department work, it would create an unnecessarily costly practice.
5. Lay administration permits a constant and closer attention to the selection, supervision, and training of medical forces from a personnel and company operating viewpoint.

It has been my observation that the answer to this question depends upon several circumstances:

1. Whether or not the physician is full-time or part-time.
2. The degree of interest or administrative ability on the part of the physician.
3. The degree to which a mutual understanding of prerogatives can be obtained to intergrate successfully the professional and administrative duties of the department, for, in the last analysis, it is difficult arbitrarily to define a distinction between these two aspects of the work.

If the industrial physician devotes his full-time to the job and has any degree of administrative ability at all, I am of the opinion that the most successful department will be the one where he has full responsibility and authority for all of the functions of his department. If the physician is in a part-time capacity, perhaps the department would function in an over-all manner more efficiently with a lay manager. I have spent considerable time in discussing this aspect of the administration of a department because this phase of organization is of extreme importance, and frequently not given adequate consideration.

Relationship with Management

PERHAPS the most important single factor contributing to the success or failure of a physician in industrial medicine at the start of his career is his status in the organization. The most efficient functioning requires that the medical director have access to top management, either the president, executive vice-president, or someone with equal rank irrespective of title designation. This in turn signifies that management in industry realize the importance of endowing the industrial physician with sufficient authority and responsibility. Situations in which the plant phys-

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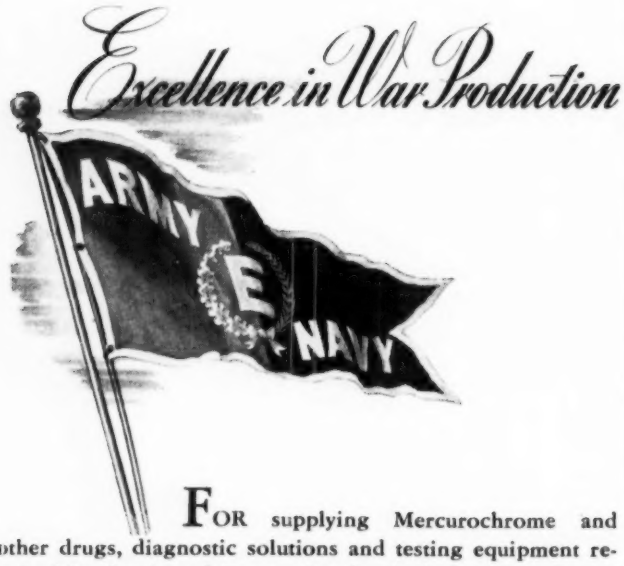

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ician is responsible to a nurse or to a welfare worker or to some other person in the organization whose rank is insignificant, minimizes the importance of the medical service in the minds of the employees. Such conditions of subordination immediately circumscribe and specifically limit the activities and usefulness of the physician and his medical department at the outset. The medical department must have the whole-hearted support of official management; without it an industrial medical service cannot attain its maximum efficiency.

Relationship with Employees

IN APPROACHING the subject of the relationships and attitude of the medical personnel with the employees, the discussion is apt to reflect personal ideas or attitudes, just as the atmosphere of most medical departments, or any departments or businesses for that matter, reflects the personality of those directing them. The first premise which appears to be sound is that the medical department should be entirely neutral in its entire administration. I have always attempted to operate under the philosophy that in every instance we would function most efficiently by doing the best possible job from a medical standpoint for each individual employee and in so doing would serve management best. Furthermore the confidential character of the majority of the work of the medical department must be scrupulously guarded. At the same time it must be recognized that management and supervision have both a stake and, in most instances, a genuine interest in the welfare of their employees, and in many specific instances should have information from the medical department in the form of advice, suggestions and recommendations concerning the employee's working hours or conditions. In such instances, we attempt always to be sure that the employee is aware of what we are going to tell his or her supervisor, and vice versa. The goal should be a situation in which the employee should feel free to consult the medical department at any time, about anything, without necessarily having been sent by supervision, and also in which the supervisor may suggest that an employee visit the medical department and have the suggestion accepted graciously and willingly. We feel that supervision has a definite place in the responsibility for the health of the employee. A person who is losing weight or has other easily recognizable signs of physical impairment, or who frequently spends time in the "Quiet Room," reports late for duty, requests permission to return home early, loses a day or more at short intervals, displays impatience and irritability with co-workers or the public, fails to eat at meal time, or gives some other equally evident sign of physical impairment, should be interviewed by the immediate supervisor with regard to suggesting medical attention before the case has progressed too far, otherwise the medical department is not in a position to discover many such cases. By the same token, however, we are very definitely of the opinion that the medical department should not be regarded by the employees as a detective bureau for management. Too rigid arbitrary rules requiring employees to report to the medical department, such as in one establishment where every person who loses a single day's absence is required to report back through the "medical," will, I believe, soon result in the detective bureau attitude on the part of the employees, with its resultant loss of confidence and cooperation.

Relationship with the Legal Department

HERE again a clear-cut bilateral understanding of attitudes and methods of approach to objectives is

of utmost importance. Of the numerous contacts which the medical and legal departments have, the one occurring with the most frequency concerns classifications of disability and problems in relation to compensation cases. Inasmuch as this whole subject is to be covered in detail later in this course, I would like to limit my observations to one point, which is that the doctor should not attempt to determine compensability any more than the lawyer should attempt to make a medical diagnosis or pass an opinion as to whether or not a given incident was competent to produce the disability. This may seem, at first glance, like a distinction without a difference, but it is an obvious fact that in nearly all instances a claims attorney is dependent, for his opinion concerning compensability, upon medical opinion as to whether the incident or circumstances related in the accident report were competent to produce the resultant disability.

Relationship with the Employment Department

THERE should be maintained a close and harmonious working relationship between the employment and the medical departments, with a mutual understanding of each other's problems and attitudes. Here there is another opportunity to point out the necessity for the physician having a complete and rather detailed knowledge of the various work or job classifications and what they involve. We prefer to visualize the medical examination as merely one phase of employment procedure, in other words that a prospective employee not be given the impression that he or she may be eligible for employment contingent on passing the medical examination. If impairments or physical or other limitations are found at the time of the physical examination, the medical and employment officers should have established a working relationship such that the problems of the prospective employee can be discussed and proper placement will eventuate depending upon the availability of a suitable job. Clearly defined recommendations from the medical department to the employment department are a necessity for the latter's proper transmittal to the prospective employee's working supervision.

This brings us to the subject of the relationship between the medical and the safety department.

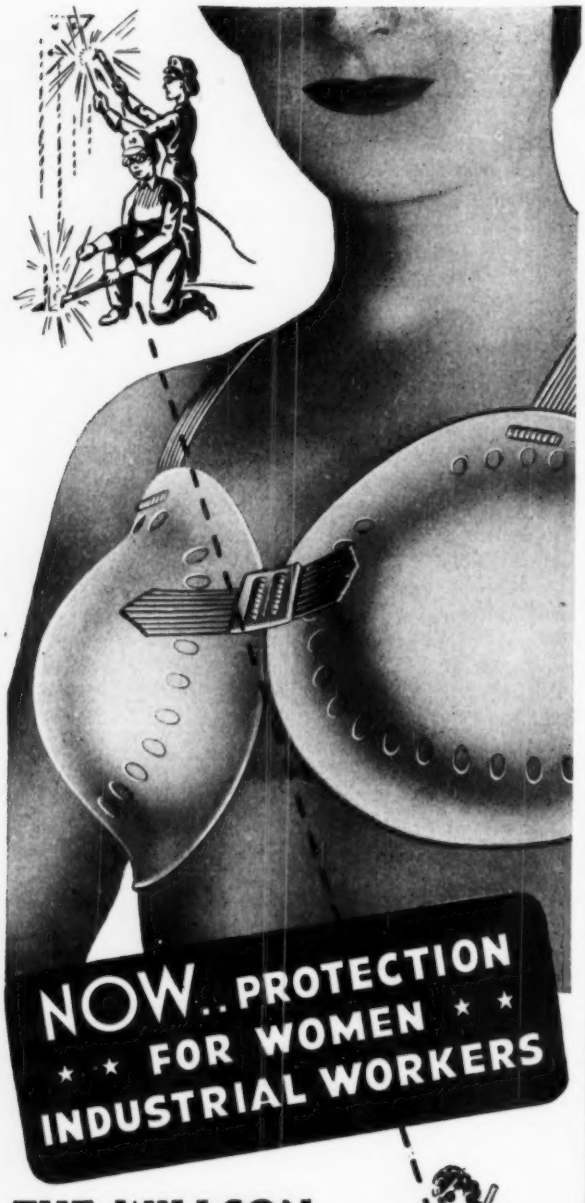
Relationship with the Safety Department

IT IS THE function of this department to analyze various job operations, to outline safety procedures for these respective operations, to be responsible for safe working conditions and elimination of hazards, and constantly to campaign to reduce accidents, both on and off the job. There is continual potentiality for conflict of opinion between the medical and safety personnel in classifications of accidents. For example, a safety program has been carefully and arduously worked out by the personnel of the safety department with the foreman and employees of installation gangs, and a particular gang has gone for a period of six months or nine months without any "on the job" accidents. Prior to the day that this group might have received some tangible recognition for its safety record, one of the group suddenly experiences a sharp pain in his knee while arising from a kneeling position and cannot fully extend the leg upon the thigh. The man is referred to the medical department and a diagnosis is made of internal derangement of the knee joint or a dislocated or fractured semilunar cartilage. From the history and immediate sequence of events this is classified by the medical department a a disability "arising out of and in the course of employment." Medically, the case is classified as an accident on duty. The safety people will perhaps argue that this man was doing his job in the usual and acceptable manner and the condition, in their mind, was the result of "physical weakness" and should not be charged against them as an accident. A service repairman, bends over to pick up his tool bag and experiences a sharp pain in the back, with a resultant period of disability. A similar type of reasoning is obtained in this kind of situation. It is not our purpose here to get into a discussion of classifications of disability or to philosophize on whether these accidents should be sub-divided into controllable or uncontrollable, but merely to point out that every day the physician in industry has opportunities to concern himself with problems of this nature, with the safety department.

Relationship with Organized Labor

BECAUSE of the apparently increasing strength of organized labor, with their demands for a voice in management and the formulation of joint labor-management committees to study various problems of mutual interest, it seems quite logical and necessary to discuss any procedures projected by the medical department, and their objectives, with these employee organizations. All of us, for example, talk in a matter of fact tone and with a foregone conclusion attitude about pre-placement or pre-employment examinations. I wonder if you realize that as recently as three years ago at an annual CIO convention, several resolutions were introduced in an effort to oppose pre-placement examinations by the organization. These resolutions never reached the floor, but they indicate the attitude of a portion of labor's ranks in this respect. At the present time, or at least up until May of this year, all of the shipbuilding unions on the West Coast had written into their contracts a specification that there should be no physical examination in connection with employment. Within the past couple of years, when the manpower situation was becoming acute in the Detroit area, it was suggested by some management groups that all employees over 50 years of age be given a physical appraisal to determine whether or not the individual workers should be exposed to, or could stand up under, increasing hours of work. Employee groups also thought that this was a proper procedure but insisted that the appraisal be made by themselves rather than by management, fearing discriminatory results if conducted otherwise. The question of annual periodic examinations for specific groups of workers is also looked upon with distrust by certain elements of labor. It is my personal opinion that in order to keep the medical department in as neutral a position as possible, and enable it to function most efficiently and to gain the confidence of the employee groups, some effort should be made to acquaint them with our policies and procedures. I feel confident that with these properly explained, and assuming, of course, that they are not discriminatory, the employee associations will give us their whole-hearted cooperation, and, as a matter of fact, can and will in many instances assist enthusiastically with health education programs once they are sold on the idea that such are of ultimate benefit to them.

I had, in my outline for this discussion, the relationships with the family physician, and with public health organizations and similar outside facilities, but again these subjects will be covered in detail at a later time. In conclusion I should like again to reiterate that the administration of an industrial medical department involves considerably more than the application of good medicine and surgery to industry, that the functioning of the medical department requires an intergration with all other aspects of the business, and that it is only through this that the medical department can make its presence felt and justify its existence to management.



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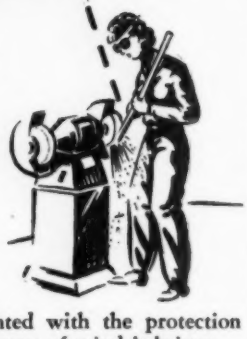

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IT IS WELL worth while for us to realize just how important the small pant is in our industrial activity. DR. JOHN PRENDERGAST states that 98.6% of our industrial plants have less than 500 workers, and that there are more than six and a half million workers in these plants. In Illinois, DR. M. H. KRONENBERG indicates that 70% of the workers are employed in plants of less than 250 employees. Generally speaking, when we talk about small plants and small plant problems, we have reference to plants of 500 or less employees. Of course there are all types of variation but, for all practical purposes, this figure of 500 or less will serve for our discussion.

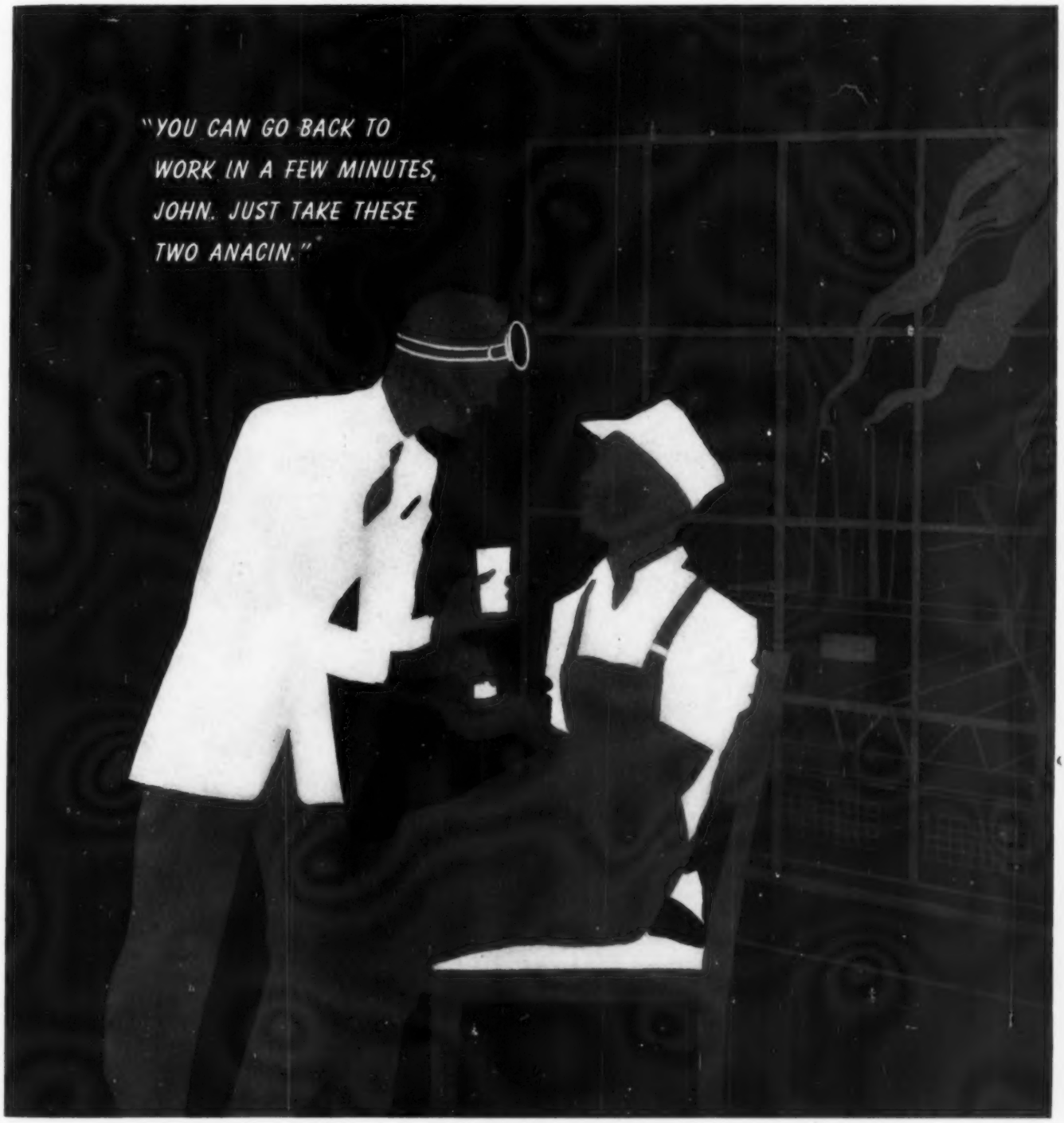
The one thought I would like to leave with you is what I call the main over-all problem of the small plant. It is the problem of providing for the small plant the same complete, comprehensive, efficient type of industrial medical service that we now see available in most larger plants.

For purposes of study, we will consider three main phases as follows: (1) Small Plant Medical Department and Equipment. (2) Personnel and Service of the Part-time Industrial Physician and Surgeon. (3) Consideration of Industrial Nursing Service in Small Plants. Thereafter we will devote some time to special studies of problems in small plant medical departments, taking up the various kinds of industrial medical service and their particular associated problems.

THE great variation in the size of industrial plants makes it difficult to set up any standard specifications or layouts for a plant of a certain number of employees. The character of the work being done and the type of industrial hazards also modify the size and the equipment of a medical department. The attitude of the plant management will have much to do with the physical equipment. Some time ago I was called upon to assist in setting up a plant medical department for 200 employees, most of whom were women. I was shown an inside room, not over 10 by 12 feet in size, placed right off the ladies' rest room, as the prospective location for such medical activities. It took me some time to convince this management that the medical department activities were not to be pigeonholed in some out of the way space or corner that no one else wanted. It is important even in small plants to maintain the dignity and prestige of the medical department and see that it rates equally well in equipment and location with other plant departments. After biding our time and gradually indicating that it was hopeless to start out such a department in a hole in the wall, we secured excellent cooperation from the higher officials, and a space 25 feet by 30 feet was allocated on the general office floor. Here there was opportunity to establish a small waiting room, a nurse's conference and treatment room, a physician's private office, and two adequate convalescent rest rooms, as well as a neat toilet and wash room. What started out to be a $500 investment amounted to more like $5,000, but the management is well satisfied, especially now that the number of employees is being doubled.

Roughly speaking, one needs from 100 to 150 square feet per 100 employees. Equipment can be simple and

Text of DR. HOLMBLAD'S Lecture at Long Island Medical College's Post-Graduate Course in Industrial Medicine, Monday evening, November 1, 1943.



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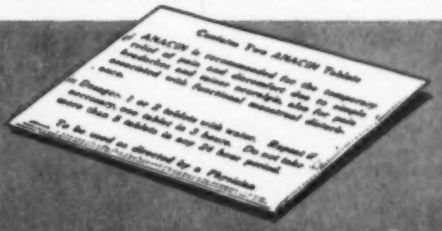

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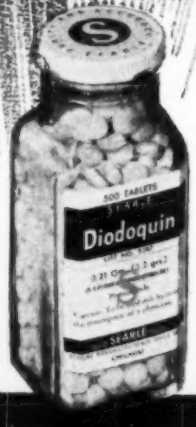
(5, 7-diiodo-8-hydroxyquinoline)



A PRODUCT OF

INDICATIONS: . Acute and chronic amebic dysentery and asymptomatic amebiasis; Trichomonas hominis.

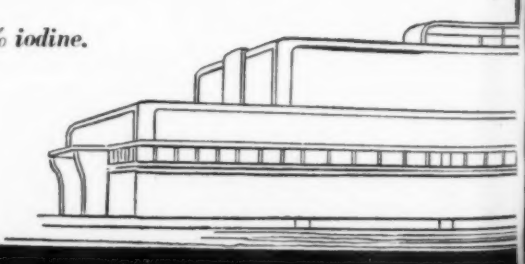
DESCRIPTION: . A double-iodine compound containing *63.9% iodine.*

ACTION: . . . Protozoacide effective by *oral* administration.

ADVANTAGES: . Does not cause purgation; relatively insoluble; large dosage permissible.

DOSAGE: . . . Diodoquin tablets may be given freely without fear of intestinal irritation. 7-10 tablets (22.4 to 32 grs.) daily for 16 to 20 days are recommended, depending upon the apparent severity of the infestation.

HOW SUPPLIED: Bottles of 50 and 500 tablets, each tablet containing 3.2 grs.



S E

RESEARCH IN

DIODOQUIN PRESENTS a double iodine compound possessing *potent and dependable amebicidal action,* together with a *wide margin of safety* in clinical use.

THE INTRODUCTION of this outstanding form of treatment for amebiasis and amebic dysentery is of utmost importance at this critical time.

WITH MILLIONS of military personnel distributed throughout the world, including the tropics, the subject of amebiasis takes on an added interest at home as well as in the war zones. Clinicians are on the lookout for carriers as well as for cases presenting mild and vague gastrointestinal symptoms.

G·D·SEARLE & CO.

ETHICAL PHARMACEUTICALS SINCE 1888

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New York • Kansas City • San Francisco

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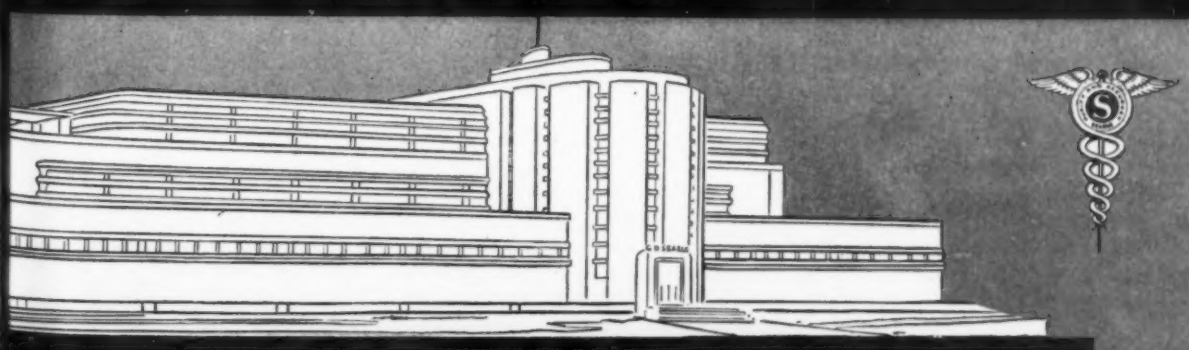
SEARLE RESEARCH



SEARLE

THE SERVICE OF MEDICINE

"MOIST HEAT" IN RESPIRATORY CONDITIONS

• CHEST COLDS • BRONCHITIS
• PLEURISY • PNEUMONIA

THE moist heat of an ANTIPHLOGISTINE pack is of definite value in relieving many of the troublesome symptoms accompanying affections of the respiratory tract.

Cough—Muscular and Pleuritic Pain—Retrosternal tightness—Soreness of the Chest.

ANTIPHLOGISTINE is a ready to use Medicated Poultice—it maintains comforting moist heat for many hours.

Formula: Chemically pure Glycerine 45.000%, Iodine 0.01%, Boric Acid 0.1%, Salicylic Acid 0.02%, Oil of Wintergreen 0.002%, Oil of Peppermint 0.002%, Oil of Eucalyptus 0.002%, Kaolin Dehydrated 54.864%.

Antiphlogistine

The Denver Chemical Mfg. Co., New York 13, N. Y.

plain, or elaborate, but always should be serviceable and not too crowded. It is always best to have special quarters for the medical department and not desirable to share a corner of the employment office or claim department. So far as possible, employees should be able to come to the medical department without being conspicuous, and with the greatest amount of privacy.

Our next question is what type of industrial medical personnel should the small plant use. The best trained industrial physician and surgeon in the locality should be obtained. His office should be reasonably close, that is, within a mile or two of the plant, for treatment of serious or emergency cases and so that he will be on call in the event of a serious accident. He should have good standing in the community, be on the staff of one of the better, or the best of the hospitals, and must realize the opportunities to render a real service to the workers in the small plant. We consider one hour per week per 100 employees to be an accepted amount of time that the part-time physician spends in the plant. We will discuss later the type of consulting medical services that should be available.

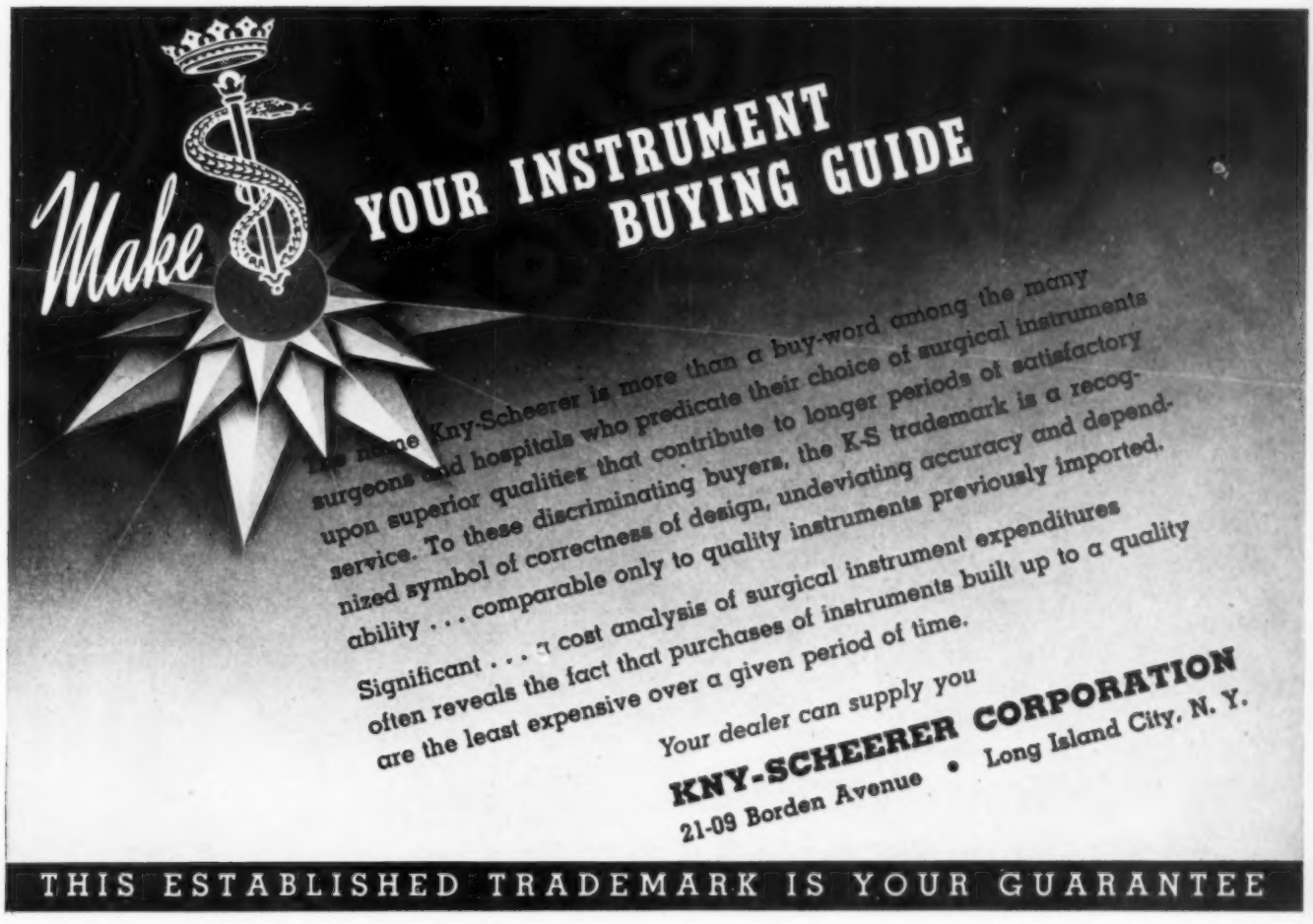
THE small plant problem has challenged the best thoughts of the profession, and several alternatives have been suggested, the more feasible being that a number of small plants group together to provide a health program under a trained industrial physician. This has proved successful.

Another approach is to be found in the association of industrial physicians and engineers for the purpose of rendering to small plants medical supervision in quantities and character suited to their needs. For emergencies, services may be had by the plant by communicating with the neighborhood physician held in reserve for just such purposes. Plant environmental investigations are conducted at such intervals as may be deemed desirable from a knowledge of factory conditions. This method has the advantage of supplying at a low cost to the manufacturer the services of a group of workers qualified in a variety of industrial health problems.

In the smaller plants where such a staff cannot be supported financially, then close cooperation might be maintained between the physician to whom the employees are referred for medical care and the engineering staff of the plant, the engineering staff of the compensation insurance carrier, and, if possible, larger plants having similar processes in the factory area.

In Philadelphia, a plan reported in operation where one physician served five small factories varying in size from 100-550 men, worked out very well. In each of these factories there was an examining room and a treatment room. The doctor was in attendance one hour per week per hundred employees. A nurse also participated in this plan. The physician conducted pre-employment and periodic check-up examinations. He was acquainted with the industrial processes and hazards of each plant, and advised management and the plant engineers in the control of these hazards. He gave health lectures and first-aid instruction, and supervised plant sanitation. In addition, of course, he took care of industrial injuries and emergency non-industrial illness and injury. It was interesting to note that all but one of the participating manufacturers felt that the plan was so worthwhile that they increased the hours of attendance of both the doctor and the nurse above the original minimum.

THE industrial nurse is the most important person in the medical department of small plants because frequently she is in full charge of these activities,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The name Kny-Scheerer is more than a buy-word among the many surgeons and hospitals who predicate their choice of surgical instruments upon superior qualities that contribute to longer periods of satisfactory service. To these discriminating buyers, the K-S trademark is a recognized symbol of correctness of design, undeviating accuracy and dependability . . . comparable only to quality instruments previously imported.
Significant . . . a cost analysis of surgical instrument expenditures often reveals the fact that purchases of instruments built up to a quality are the least expensive over a given period of time.
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being supplemented by only a few hours per week on the part of the part-time physician. She should have had adequate training in the specialty of industrial nursing after a well grounded nurse's experience. She should demand the respect of all the employees and be the type that makes a good counselor and one to whom the employees may go and discuss their medical as well as their home problems and activities.

Present opportunities in industrial nursing can best be explained by discussing the qualifications of an industrial nurse, including special capabilities necessary for industrial nursing in contrast to other forms of nursing, and certain other qualifications which will enable her to adapt herself to the particular needs of manufacturers employing labor on a small scale.

Naturally such attributes as neatness, character and pleasing personality, along with academic attainments such as graduation from the best type of nursing school are essential. Innate enthusiasm and interest in workers of all classes are no less important in small industries than in large plants. In the smallest industrial units, where there is no provision for attendance by a physician, the industrial nurse must be able to assume certain additional responsibilities. She should also have that rare ability to carry out certain administrative functions in a friendly manner, yet ever maintaining the dignity of her profession.

The industrial nurse must have more than these admirable qualities to fit into a small scale industry. She must be able to understand problems of management and supervision as well as those of wage earners, and in some instances act as an adviser in promoting mutual understanding between these groups. Her position in this aspect of promoting a fine employee-employer relationship is unique indeed.

It is usually recognized that all industrial nurses are carrying out at least a type of public health problems and should understand the entire local program of public health agencies.

NOW we are ready to take up the special consideration of the various problems that come up in small plants in the several services that constitute an adequate industrial medical service.

Pre-employment, or, better termed, pre-placement, examinations will have to be done whenever new applicants present themselves to the employment department, or reasonably soon thereafter. In many plants a standard form is started by the nurse at the plant or the physician's office nurse if the plant is not large enough to have a plant nurse. They can usually be done in the late morning between 10:00 and 1:00 o'clock so as not to interfere with the doctor's afternoon office hours. Small plant managements are usually in a better position to provide special jobs for workers requiring such consideration. Recently in a plant of 50 employees we found suitable jobs for many 4-F army rejectees. Among these was a young colored man, 21 years of age, with bi-lateral, congenital absence of both clavicles. He is on work not requiring any heavy lifting, and has become a very desirable employee. Another patient was placed in this same plant, having had an extensive tendon reconstruction operation that was done at the Cook County Hospital in April, 1943. He has a job winding rollers with his good hand, and only occasionally uses his operated hand for guiding and supplementary service. In smaller plants the doctor usually knows the management quite thoroughly and can call up the superintendent or man in charge and arrange for these special jobs. Such cooperation frequently produces an appreciated interested employee who may become so valuable to the small plant operator that the handicapped worker makes himself indispensable. I think

LOCAL THERAPY IN CORYZA

"the most devastating of all sickness"

. . . for safe, soothing symptomatic relief
. . . and to help prevent complications

PINEOLEUM* PLAIN—widely recommended for the stimulating and mildly antiseptic value of its camphor (.50%), menthol (.50%), and oils of eucalyptus (.56%), pine needles (1.00%), and cassia (.07%)—incorporated in a protective base of bland, highly refined liquid petrolatum—for use as spray or drops.

PINEOLEUM* WITH EPHEDRINE—contains (in addition to the standard formula) .50% ephedrine, thus furnishing a safe degree of vasoconstrictive action where desired—in same form as above.

PINEOLEUM* EPHEDRINE JELLY—in handy nasal applicator tubes, for greater convenience plus ease of application.

* Reg. U.S. Pat. Off.

THE PINEOLEUM CO., NEW YORK 4, N. Y.

it is always a good idea to terminate the pre-placement examination with a short statement about the person's health such as "don't forget those teeth," or "better be on the lookout for any trouble that might come from those tonsils," etc. Further, I usually close the interview by saying, "I hope you enjoy your new work," or, "I am sure you will get a thrill out of this job."

Periodic examinations can be done on the small plant employees just as well as in the larger industries. A plant of 100 employees can send two periodic examinations to the doctor's office each week, or, if a doctor spends an afternoon at the plant, these two examinations can constitute part of that afternoon's work each week.

One insurance company with a branch office in Chicago with some 60 employees, sends over about one employee a week to us for their annual periodic examination. They come either early in the morning on their way down to work, or immediately before the lunch hour, or just before going home. We keep carbon copies of these examination records in our office, and it is easy to follow the health and physical condition of these employees from year to year with interval histories and physical findings noted.

EXAMINATIONS after illnesses. Operations or absences of more than three days are also easily checked. We note the last day worked, then we get a letter from the attending physician or surgeon, setting forth the important facts, and signed by the patient, giving his doctor permission to forward this information. We usually make it brief and leave a space so the doctor can fill it out easily and return it in a self-addressed envelope. The following sample form will serve to illustrate this procedure that has always worked so well in our experience.

Dr. John Smith,
0000 E. Chicago Avenue,
Chicago, Illinois

Date: November 1, 1943
Re: Walter Brown,
0000 State St.,
Chicago, Ill.

Dear Sir:

Mr. Walter Brown has presented himself for an examination as to his fitness to resume work with the XYZ Company, following his recent illness (or operation). Will you kindly furnish us the following information so that we may give him due consideration as to his re-employability?

Date of first treatment:.....
Date of last treatment:.....
Diagnosis: .....
Operation, if any:.....
Present condition:.....
In your opinion has he recovered to such a degree as to be able to resume work? If so:
(a) What kind of work?.....
(b) When? .....

Thanking you for this information, I am
Yours very truly,

.....
Drs. Holmblad and Jacobson

DR. JOHN SMITH:

Please give to Drs. Holmblad and Jacobson full information regarding my recent illness.

.....
WITNESS:.....
Date....., 1943
(Enclosure: Self-addressed stamped envelope)

INJURIES occurring on duty must be given prompt, efficient medical attention. When there is a competent industrial nurse on duty part- or full-time, she may attend the minor injuries under the doctor's supervision and send those cases that warrant his

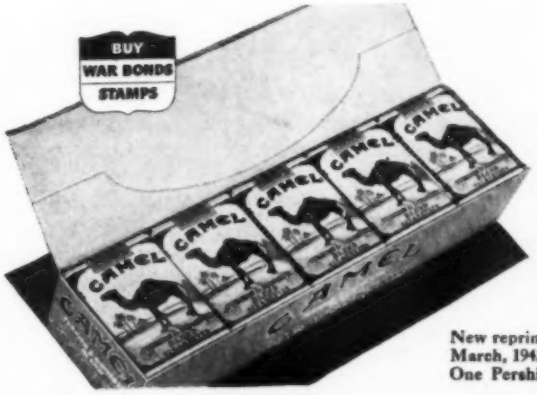
SURGERY UNDER SIEGE!

Steady hands, unwavering eyes... he needs them now. Never mind the bombs and shrapnel. Every case an "emergency"... an endless strain, a withering grind. But today's army field surgeon can take it. Like the men at the guns he seldom relaxes, but when he does, you can be sure he appreciates a cheering smoke.

Add to his cheer. Send a carton of Camels ... a token of your personal appreciation for his sacrifices. Remember—Camel is first choice in the armed forces* ... for mildness, better taste. See your dealer today.

1st in the Service

*With men in the Army, Navy, Marine Corps, and Coast Guard, the favorite cigarette is Camel. (Based on actual sales records.)



Camel

costlier tobaccos

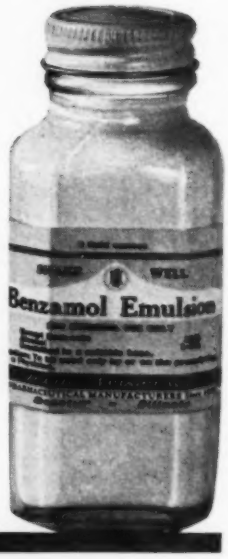
New reprint available on cigarette research—Archives of Otolaryngology, March, 1943, pp. 404-410. Camel Cigarettes, Medical Relations Division, One Pershing Square, New York 17, N. Y.

Prompt, Effective *Eradication* of SCABIES

UP TO the present time no acaricide has been found which offers the prompt action, simplicity of application, and cosmetic elegance of BENZAMOL.

These qualities appeal strongly to the industrial physician. The duties of the patient are not interrupted, nor is he embarrassed by a messy application with a disagreeable odor . . . and a single treatment usually suffices.

After a hot bath, BENZAMOL is applied to the affected areas, allowed to dry and applied a second time. Another hot bath and an entire change of clothing the next day complete the treatment.



HOW SUPPLIED: In three ounce bottles

BENZAMOL

Trade Mark

IRWIN, NEISLER & COMPANY

Pharmaceutical Manufacturers Since 1886

DECATUR ILLINOIS

attention promptly to his office. All infected cases should be seen by the doctor the first day they present themselves. I severely censor any management foreman or nurse who tells a patient to wait until the end of the day to get first attention. It is true that subsequent dressings can be made at more opportune times, but the first attention should not be delayed, and it is wise for the nurse to telephone the doctor so that he knows the patient is coming and will be available.

ILLNESSES occurring on duty may be simple, requiring only rest, simple medication or a short period of convalescence, such as headaches, menstrual cramps, diarrhea and the like. More serious illnesses such as chills, fever, abdominal pains that are potentially appendicitis cases and the like, should be relieved of duty and assisted home, and it is always a nice gesture to call the patient's family physician and state the situation to him. In these busy times, the doctor will appreciate such information. Remember that proportionately one-third of all the appendicitis cases, ruptured gastric ulcers, cerebral hemorrhage and coronary heart disease attacks, will occur during the eight hours a person works out of every 24 hours.

RECORDS are just as important in small plants as in large ones, and usually lend themselves readily to better progress notes and descriptions. Remember all injury cases and severe illnesses will become problem cases requiring consideration, and may be long drawn out and get into litigation. In such cases the early medical history is very important. Previous existing conditions such as varicose veins, old scars and deformities of fingers are always important to record.

In addition to an adequate description of the injury at the outset, it is very important to write supplementary reports at sufficiently frequent intervals to keep the management posted on the progress of the case. The more serious the injury, the more frequent and elaborate these supplementary reports. This is one of the departments where the general practitioner or part-time industrial physician and surgeon is very apt to fall down on the job. He may think it more important to treat patients than to write reports and keep notes, but any physician competently trained in the specialty of industrial medicine and surgery knows that if any industrial case is worth taking care of at all, it is worth taking care of properly, including adequate (not necessarily excessive) paper work.

MANY small plants are now working 24 hours a day and these plants should be adequately covered with "on call" medical and surgical services at all times. Only a thoughtless, incompetent physician would leave such a plant without adequate coverage. If he goes out of town someone else should be assigned to the plant, and the doctor's office or his home should know where he can be reached at all times.

Problem cases occur among the workers of small industries just exactly as they do in larger industries. They may be cases of prolonged treatment such as occur with certain cases of delayed union of fractures. Unusually slow healing wounds from systemic infections or other general body conditions such as diabetes, syphilis or impaired circulation very frequently may be the basis for the start of an unusual or problem case. Then we get those unfortunate individuals who are the victims of anxiety neurosis, or traumatic neurosis following accidental injuries.

MOST large industries have a routine procedure to follow up the problem case. They have, usually, regular consulting staff members for the outstanding

CONTROL MAN-HOUR LOSSES DUE TO MUSCLE PAIN

More and more, time losses are being reduced with the proven method of applying a Johnson's Red Cross Plaster to the painful part. The quick and easy application of this popular medicated plaster often affords sufficient relief in the common forms of muscular aches and pain. The beneficial effects of this time-honored medicated plaster are attributed to warmth, anodyne effect, physical support and passive massage. The next time you get a complaint use this approved treatment.

Send for trial supply of Johnson's Red Cross Plasters.
Check results after employees have used them.

JOHNSON'S RED CROSS PLASTER

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NEW BRUNSWICK, N. J. CHICAGO, ILL.

JOHNSON & JOHNSON Dept. 33
New Brunswick, N. J.
Send me trial supply of Johnson's Red Cross Plasters.

..... M.D.
Company.....
Address.....
City & State.....

DON'T LET MINOR INJURIES BECOME MAJOR PRODUCTION PROBLEMS

NEW-SKIN is also recommended in the control and treatment of poison ivy dermatitis... as a protection against blisters, calluses, cast irritation, post-operative area infection.

This new size bottle exclusively for professional and industrial use.

Treat them quickly with NEW-SKIN ...reduce time losses from accidents

When minor injuries are treated promptly with NEW-SKIN Antiseptic Covering, loss of time is reduced to a minimum. NEW-SKIN protects cuts, burns, abrasions from dirt and dust, lessens danger of infections.

NEW-SKIN diffuses evenly, smoothly and "gives" with muscular flexation, without impairing its function.

The superiority and utility of NEW-SKIN Antiseptic Covering in protecting against contamination recommends its use in clinic, office and home.

For greater convenience and economy NEW-SKIN is now available in a new, larger . . . 8 ounce . . . bottle for professional and industrial use.

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NEW-SKIN

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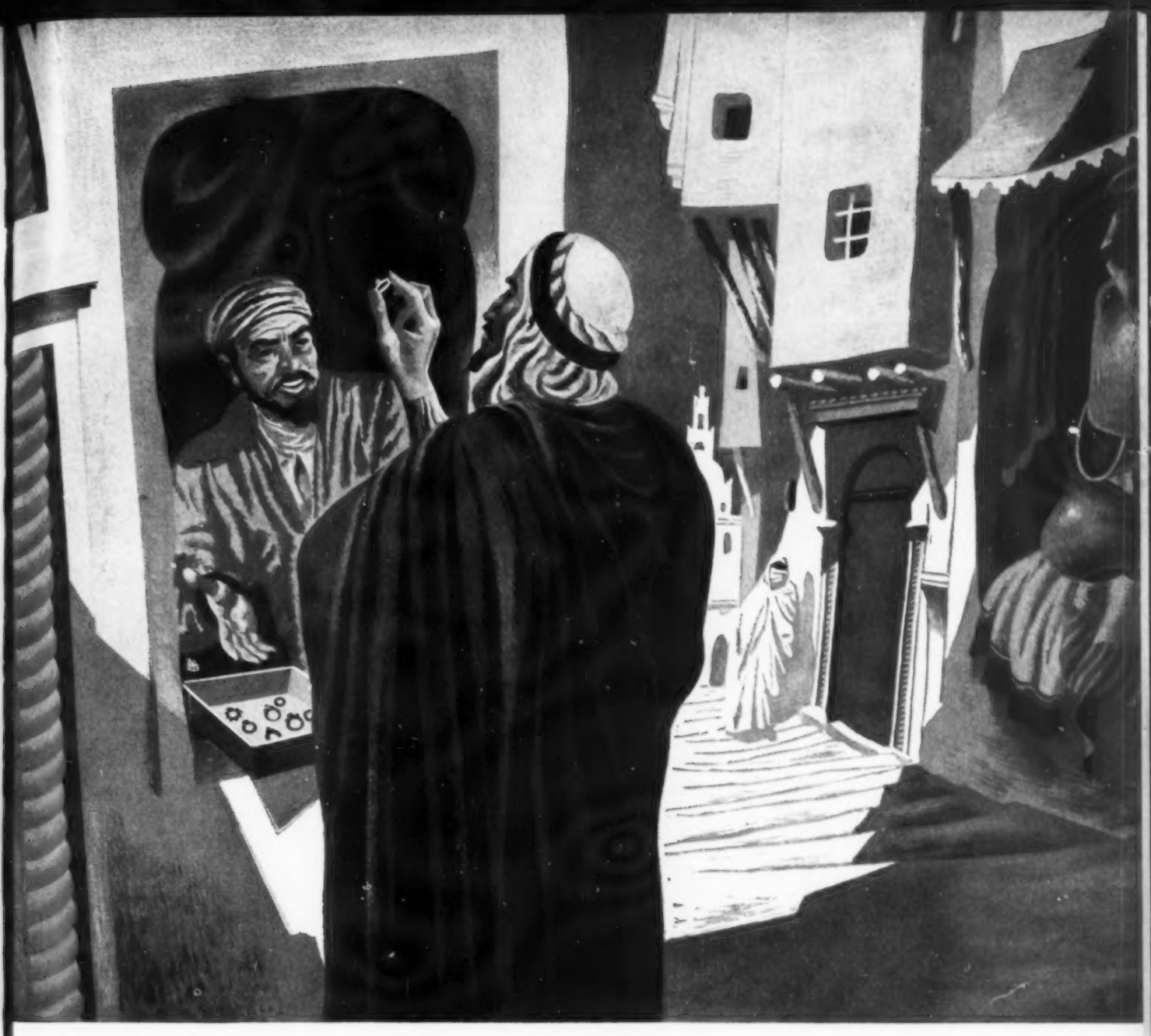
Other New-Skin sizes at all drug stores—1 dram, 15¢ —½ oz. 30¢—1½ oz. 50¢.

specialties. These will include the oculist, the roentgenologist, orthopedist, neurologist, cardiologist, psychiatrist, neurological surgeon, general surgeons and internists. These regular consultants have learned the significance of the industrial angle or viewpoint in order to render the best service to the injured worker and to aid him in his recovery. These specialists know how to transport their problem cases from a state of total disability or incapacity to a gradual status of work activity by means of a sensible, planned program of rehabilitation. Just an example or two which I think will serve to illustrate this point. We have noticed the marked difference in the temporary total disability periods in eye cases where it has been necessary to enucleate an eye from trauma. The eye specialist with industrial training knows how to get his patient well and back on the job promptly, while the eye specialist without this industrial training may keep this type of apprehensive patient in the hospital a much longer time than necessary. He may even foster or nourish a state of neurosis. Patients with operations for hernia offer another example. The usual temporary total disability periods following hernia operations in industrial patients range from five to eight weeks, depending on the type of work to which they are to return. I have seen patients operated for hernia by excellent general surgeons who have been told by these surgeons not to do any work for five or six months. The small plant part-time surgeon, as well as its management, must recognize the advisability of getting problem cases into the hands of specialists who have had experience with industrial cases and who can understand this working man's reactions. Any specialist, or anybody for that matter, can tell an injured workman to stay away from work. It takes an expert with adequate experience, tact and ingenuity accurately to diagnose the problem case and then to initiate, guide and follow-up a sensible, planned rehabilitative treatment program. Delayed union of fractures, back, shoulder and knee disability cases frequently fall into this category.

END RESULT appraisals is another department where the small plant physician and surgeon may be lacking in experience. When cases of adequate injury have reached a certain stage of permanent disability, the amount of specific loss or permanent disability should be properly evaluated and reported to the management for settlement consideration. There is a most interesting observation to make in this connection, and that is the wide difference of opinion between the end result appraisal of the treating physician and the surgeon who sees the case for a final check-up. I don't know exactly why it is—probably pride in their treatment of the injury or wishful thinking on the part of the treating surgeon—but he almost invariably markedly under-estimates the amount of permanent disability. Compression fracture of the spine, fractures of the hip in middle-aged to elderly people, disfigurement from burns, loss of soft tissue substance, or portions of the bones of injured fingers, may all be reported as having made a wonderful recovery with no permanent disability. Obviously these treating doctors were not responsible for the injuries, why should they try to minimize their end-result estimates? By falsely reporting these end results they make it difficult for the management to work out an equitable settlement with their injured employee. In the case of an insurance carrier, how can a branch claim manager work out a settlement satisfactory to his home office if the file has in it a report from the treating physician indicating no permanent disability? Thus,



The Enchanted Ring . . .

"Greatly prized among the Moors is a stone called ain 1-horr. *It is said that as long as a man wears this gem in a ring of gold he will beget no offspring.**

● An important phase of medical practice and public health programs today is instruction on child-spacing. When the physician advises deferment of pregnancy, modern methods enable him to make his counsel practicable. Ortho-Gynol Vaginal Jelly meets the most exacting requirements for a contraceptive preparation. It immobilizes sperm instantly on contact, is well tolerated in continued use, stable and uniform in its properties. Ortho-Gynol Vaginal Jelly is widely prescribed in doctors' offices and clinics . . . a tribute not only to its effectiveness but to its acceptability among patients.

*Himes, *Medical History of Contraception*

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ACTIVE INGREDIENTS: RICINOLEIC ACID, BORIC ACID, OXYQUINOLINE SULFATE.

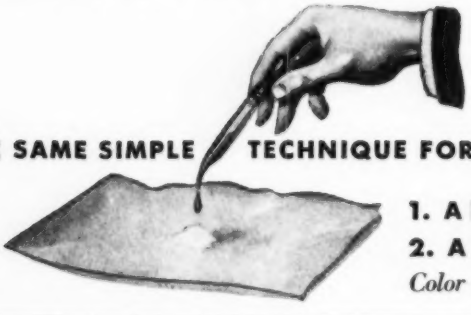
QUESTION: WHAT'S NEW IN "ROUTINE" URINALYSIS?

ANSWER: THE NEW *Acetone Test* (DENCO)

Acetone Test (Denco) is a companion product to Galatest (dry reagent for urine sugar). These two tests work together to shorten and simplify "routine" urinalysis.

Acetone Test (Denco) detects the presence or absence of acetone in urine in one minute. The color reaction is identical to that found in the violet ring tests and is equally easy to differentiate. A trace of acetone turns the powder light lavender—larger amounts turn it to dark purple. Acetone Test (Denco) is available in vials containing enough powder for over 125 complete tests, also in combination kits with Galatest.

A carrying case containing one vial of Acetone Test (Denco) and one vial of Galatest is now available. This is very convenient for the medical bag or for the diabetic patient. The case also contains a medicine dropper and a Galatest color chart. The handy kit or refills of Acetone Test (Denco) and Galatest are obtainable at all prescription pharmacies and surgical supply houses.



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1. A little powder
2. A little urine

Color reaction instantly

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Write for descriptive literature to

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163 Varick Street, New York 13, N. Y.

you see, it will probably be necessary to have at least one non-treating surgeon's appraisal of the end result.

LITIGATION cases occuring among the workers in small plants may need the assistance of competently trained industrial physicians and surgeons. The part-time plant physician or general practitioner should be called upon to establish the facts in connection with an injury, but it is perhaps best that he avoid testifying as an expert when a shrewd opposing counsel's cross examination may make his testimony appear contradictory or give it an entirely different meaning from what the doctor tried to state. Counsel should recognize the limitations of the small plant physician as a court witness and give him the support of adequate expert testimony.

With occupational disease hazards and exposures, the small plant physician has the opportunity to solicit the help and guidance of the State Health Department Industrial Hygiene units that now exist in almost every state. In addition, many of the larger cities have industrial hygiene plant survey services, and these should be adequately utilized.

May I close by calling your attention to the fact that there are excellent opportunities for the small plant physician to undertake regular plant sanitation inspection trips and surveys. He can develop regular health education and health programs in small plants in so far as he has had adequate training in the specialty of industrial medicine and surgery; also depending upon his ability and initiative, and his desire to make the most out of his opportunity to serve the small plant workers. He will never accomplish the best results if he does the least amount of work he can get by with and still be privileged to do any of the plant work, or if he is so interested in other types of practice that he relegates his small plant medical work to a status of minor or insignificant importance in his daily duties.

Post-Graduate Course

—In Industrial Medicine and Hygiene—

PRESENTED under the auspices of the Committees on Industrial Health of the Illinois State Medical Society and the Chicago Medical Society, and directed by the University of Illinois College of Medicine and the Division of Industrial Hygiene, Illinois State Department of Public Health, the following Post-Graduate Course in Industrial Medicine and Hygiene will be given at the University of Illinois College of Medicine, January 4 to March 28, 1944.

In announcing the course the committee makes the following general statement:

A SICK ROOM HELP SHE CAN'T FORGET!

QUICKLY Comforts Itching, Burning of

ECZEMA, CHAFING, BED SORES, SHEET BURNS, ATHLETE'S FOOT, ACID PERSPIRATION, BLISTERS, CHAPPING, IVY OR OAK POISONING, INSECT BITES AND STINGS, COLD SORES, MINOR BURNS, PRICKLY HEAT, SIMPLE RASHES, RECTAL IRRITATION.

All U. S. P. ingredients: phenol ⅓ of 1% with oil of cade, sulphur, salicylic acid, menthol and zinc oxide in ointment base.

POSLAM

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INDUSTRY today demands the services of physicians who are familiar with available knowledge of potential health hazards. Particular attention is focused on the field of industrial health problems at this time by both employers and employees concerning the effects occupations may have on health. In sponsoring this course the Committee on Industrial Health of the Illinois State Medical Society and the Chicago Medical Society are convinced that the present trend in the industrial health field makes it imperative that physicians with industrial contacts and those in private practice have a working knowledge of current problems in industry as they relate to medicine. Physicians should be cognizant of the wide field of industrial medicine and hygiene, as they may be called upon to make recommendations in regard to protective measures for all occupational health hazards. It is only proper that physicians assume this responsibility.

"All lectures scheduled will be held at the University of Illinois, College of Medicine, 1853 West Polk Street, Chicago. The course will be conducted principally by physicians in industrial medical practice. All registrations must be received by December 27, as the class is limited to 40 physicians. The fee for the course is $25, payable at the time of registration. The length of the course will be 12 weeks, beginning January 4, 1944 and ending March 28, 1944. Checks should accompany the registration blank and be made payable to the University of Illinois, College of Medicine, Chicago. Address all inquiries for further information to: DR. FREDERICK W. SLOBE, 2024 South Western Avenue, Chicago, Illinois."

All meetings will be evening sessions beginning at 7:00 o'clock, the dates and subjects being as follows:

Tuesday Evening, January 4, 1944

ADDRESS of Welcome—RAYMOND B. ALLEN, M.D., Dean, College of Medicine, University of Illinois.

Response: GEORGE W. POST, M.D., President, Illinois State Medical Society, and OSCAR HAWKINSON, M.D., President, Chicago Medical Society.

EDWARD C. HOLMBLAD, M.D., Managing Director, American Association of Industrial Physicians and Surgeons, presiding:

"How Does the Industrial Medical Department Operate"—Lecturer: JOSEPH H. CHIVERS, M.D., Medical Director, Crane Co., Chicago.

Tuesday Evening, January 11

WILL F. LYON, M.D., Medical Director, International Harvester Company, Chicago, presiding:

"The Pneumoconioses":

"The Dusty Trades"—Lecturer: MILTON H. KRONENBERG, M.D., Division of Industrial Hygiene, Illinois State Health Department.

"Roentgenological Aspects and Interpretation"—Lecturer: ADOLPH HARTUNG, M.D., Professor of Radiology, University of Illinois, College of Medicine.

Tuesday Evening, January 18

CARL M. PETERSON, M.D., Secretary, Council on Industrial Health, American Medical Association, Chicago, presiding:

"Industrial Toxicology and Poisonings": "Lead and the Heavy Metals"—Lecturer: ROBERT A. KEHOE, M.D., Director, Kettering Laboratory of Applied Physiology, University of Cincinnati, College of Medicine.

Tuesday Evening, January 25

RICHARD BENNETT, M.D., Chief Surgeon, Carnegie-Illinois Steel Company, Chicago, presiding:

"Industrial Toxicology and Poisonings" (cont.):

"Fumes, Gases and Vapors"—Lecturer: JAMES H. STERNER, M.D., Eastman Kodak Company, Rochester, New York.

Tuesday Evening, February 1

HAROLD EARNHART, M.D., Medical Director, Swift and Company, Chicago, presiding:

"Medical Problems in Industry": "Tuberculosis, Heart, Hypertension, Diabetes, Nephritis, Occupational Anemias"—Lecturer: ROBERT W. KEETON, M.D., Professor of Medi-

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Tuesday Evening, February 8

FRANCIS E. SENEAR, M.D., Professor of Dermatology and Head of Department, University of Illinois, College of Medicine, presiding:

"Industrial Dermatoses"—Lecturer: LOUIS SCHWARTZ, M.D., CHIEF, Dermatoses Investigation Section, Division of Industrial Hygiene, National Institute of Health, Bethesda, Maryland.

Tuesday Evening, February 15

WILLIAM D. MCNALLY, Coroners Chemist, Cook County, Chicago, presiding:

"Industrial Medical Aspects of Fatigue, Noise, Humidity, Temperature Extremes and Abnormal Pressures"—Lecturer: GEORGE E. WAKERLIN, M.D., Professor of Physiology and Head of Department, University of Illinois, College of Medicine.

Tuesday Evening, February 22

KENNETH M. MORSE, Industrial Hygiene Engineer, Illinois State Department of Public Health, Chicago, presiding:

"Protecting the Place of Employment"—Lecturer: JOHN J. BLOOMFIELD, Senior Sanitary Engineer, Chief, States Relations Section, Division of Industrial Hygiene, National Institute of Health, Bethesda, Maryland.

Tuesday Evening, February 29

ROY J. DE MOTTE, M.D., Chief Surgeon, Pullman-Standard Car Manufacturing Company, Chicago, presiding:

"Essentials in Emergency Treatment"—Lecturer: FREDERICK W. SLOBE, M.D., Medical Director, Automatic Electric Company, Chicago.

Tuesday Evening, March 7

LEROY SLOAN, M.D., Chicago, Illinois, presiding:

"The Industrial Physician and Community Health Relationships":

"Syphilis, Tuberculosis, Nutrition, Rehabilitation"—Lecturer, HAROLD A. VONACHEN, M.D., Medical Director, Caterpillar Tractor Company, Peoria, Illinois.

Tuesday Evening, March 14

FRANK P. HAMMOND, M.D., Secretary, Chicago Society of Industrial Medicine and Surgery, presiding:

"Medicolegal Aspects of Industrial Medical Practice"—Lecturers: CLARENCE O. SAPPINGTON, M.D., DR. P. H., Consulting Industrial Hygienist, Chicago, and MR. FRANK PEREGRINE, Attorney, Chicago.

Tuesday, March 21

FIELD TRIP for registrants. Name of plant to be visited and other arrangements to be announced by the Chairman of the course.

Tuesday, March 28

DINNER. Toastmaster—HAROLD M. CAMP, M.D., Secretary, Illinois State Medical Society.

Address: "The Responsibility of the Physician in Industrial Practice"—CLARENCE D. SELBY, M.D., Medical Consultant, General Motors Corporation, Detroit, Michigan.

—Continued from page 38

out of industry is destined to continuous growth, for industry has now found the well-trained industrial physician to be indispensable.

In Virginia

DR. A. G. EVANS, health officer for the Giles-Montgomery-Radford health district, Christiansburg, Virginia, has released the fifth annual report for the county and the first for the district, in which he lists, among the major developments on the health fronts: 27 new cases of tuberculosis discovered, 5,629 persons x-rayed, six industrial hygiene surveys, 1,410 smallpox vaccinations, 1,116 diphtheria immunizations, 5,558 hearing tests, nutrition survey of 939 children, ordinances adopted for the promotion of sanitation; 744 food handlers examined, 2,990 treatments for social diseases. He lists the seven leading causes of death in this area as heart disease, accidents, nephritis, diseases of early infancy, cancer, cerebral hemorrhage and diseases of digestive system. The aims of the department include communicable disease control, venereal diseases and tuberculosis control, industrial hygiene. Preschool and school clinics and prenatal and well-baby clinics are held. Special activities include eye clinics, orthopedic service, hearing tests and a nutritional campaign. One of the basic programs of the health department is provision and maintenance of sanitation.

—Roanoke, Va., Times, October 24.

Health Programs

THE importance of pre-placement physical examinations in times of manpower shortages was stressed today by DR. LEMUEL C. MCGEE, medical director of Hercules Powder Company, at the Junior Chamber of Commerce luncheon in the Hotel Du Pont. "A person having a physical defect which bars him from a particular job can prove highly satisfactory when placed in other work," he explained. Going back to Egyptian medical records of 5,000 B.C., he said that physicians then were aware of specialized medical injuries, particularly those entailed in the building of pyramids. One of the latest advancements in the progress of industrial health, DR. MCGEE remarked, was the program adopted last year by the Chamber of Commerce of the United States, in which it planned to compile facts of actual practicality and benefits of industrial health programs, instruct plant managers on their value, and help establish such programs in plants. At a Hercules plant where such a medical program is installed, 50% of all remediable defects had been corrected within a year. Explaining industrial hygiene, DR. MCGEE said that it covers plant sanitation, health education, control of the workers' environment, and of occupational diseases. For a relatively small output to provide medical care, industry can reap large rewards in increasing efficiency and reducing absenteeism on the part of its workers, he said.

—Wilmington, Del., Evening Journal, November 18.

Industry, Labor, and Medicine

WHEN one considers the attempted social developments in the last six or more years, it is apparent that there have been changes, legislative and in public thought. The matter of medical care has become interwoven in the plans of all groups until it has gradually assumed a position of major importance. It was indicated early by the passage of the Social Security Act and subsequent attempts to include compulsory health insurance that these developments would be in and around industry. The most strenuous, by virtue of the administrative set-up, confronts us now. In-

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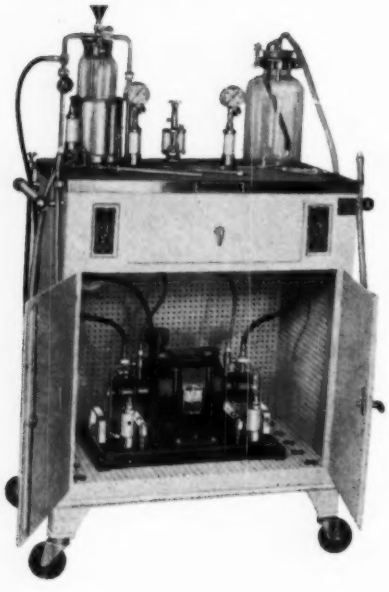

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dustry, labor, and medicine are inextricably involved and their interests are mutual. The course of action is clear, the establishment of medical programs in industry along accepted ethical lines. When one realizes the scope and implications of such programs of industrial health, it becomes evident that they are a solution in a positive manner when widely in force. Extension of these services requires an effective cooperative plan carried out by medical, industrial and labor organizations. We are fortunate at this point in that we have the experience of successful plans elsewhere in the country. They have been designed to improve the medical service in small plants particularly.

—From "Industrial Medical Relationships," by ORLEN J. JOHNSON, M.D., of A.M.A. Counell on Industrial Health, in *J. Iowa State M. S.*, November, 1943.

Politics Uppermost

THE answer to the question of why we cannot have a reduced system of Social Security lies in the fact that a broad plan, such as is advocated by the National Resources Planning Board, has for its ultimate aim not the satisfaction of genuine social needs of a small under-privileged, handicapped, and disabled part of our population, but the perpetuation of a political interest which wants to identify itself with the personal life of every citizen and every family throughout the nation. Social Security under Federal sponsorship, once it gets rolling, tends to assume the characteristics of an avalanche. It gathers speed along with volume. You can take any Social Security, except that of the Soviet Union, and you will find that in its initial phase it covered one or perhaps two types of need. New Zealand started with old-age pensions in 1898, and with sickness insurance in 1911, and today owns about the most elaborate and most expensive system of Social Security that can be found anywhere in the world. Germany started with state insurance early in the nineties and also developed a system of Social Security which, up to the first World War, was perhaps the best organized of any. Great Britain began with a system of health insurance in 1911 and is now about to arrive at the complex and all-inclusive system of social protection set forth in the Beveridge Plan. It is inconceivable that in all these cases the fortunes of the people should have grown progressively worse. It is much more likely that certain interests found it to their advantage to press for an ever-expanding system.

—From "Significance of Social Security," by GERHARD HIRSCHFILD, in *Detroit Medical News*, October 25.

Acute Colds

I WOULD like to say a few words in regard to the treatment of acute colds. In 1939, before a meeting of the Michigan State Society, I advocated the use of hydrochloric acid and sodium chloride in preference to soda and alkaline drinks, based on the belief that most people are in an alkaline state at the onset of an acute cold. I am convinced more than ever that this theory is correct and you will find that a teaspoonful of salt in a glass of cold water taken once or even several times during the first day of an acute cold will be much more helpful than soda bicarbonate. I have found also that five to seven drops of dilute hydrochloric acid taken 30- to 40-minute intervals for five or six doses at the onset of a cold may give immediate relief. The taking of large quantities of orange juice and grapefruit juice is often very bad for the patient. It is unfortunate that alkaline preparations have been so widely advertised over the radio for the treatment of colds. The use of most nose drops is greatly abused, especially in infants. One drop of a nasal solution will do as much good as four or five drops and will not get into the lung. There is no objection to the use of atomizers, and in the case of an acute rhinitis or sinusitis the following combination will give considerable relief: Cocaine hydrochloride grains 1, solution of neosynephrine ½%, saturated solution of boric acid aa ounces ½. Directions: use in atomizer. In using an atomizer, spray one or two puffs with a fine atomizer and then wait five to 10 minutes before applying again, as the first spray can strike and reduce only the swelling in the anterior part of the nose. Most people, however, will attempt to inject quantities of the solution but must, of course, await the gradual reduction in the swelling to get relief.

—From "Otolaryngology in General Practice," by HENRY M. GOODYEAR, M.D., in *West Virginia M. J.*, November, 1943.

INDUSTRIAL HEALTH and DISEASE

Industrial Medical Program of the Army

HAROLD R. HENNESSY
Lieutenant Colonel, Medical Corps;
Industrial Medical Officer,
Ninth Service Command,
Fort Douglas, Utah

MODERN military activity depends basically on efficient and coordinated industrial production. In times like these, the overriding need for "production" is likely to lead to the neglect of health of industrial workers. Such a condition, if uncontrolled, may produce very serious effects upon industrial efficiency.

Presented before Utah State Medical Association, Salt Lake City, August 27, 1943. Published with permission of War Department, Bureau of Public Relations, in Rocky Mountain Med. J., November, 1943.

In an address before the Industrial Hygiene Section of the American Public Health Association held in St. Louis October 27, 1942, Medical Director James G. Townsend, U. S. Public Health Service, stated: "Industrial health is a prime contractor in this nation's war. Today when every disabled war worker means less planes, ships, tanks, and guns, the National Industrial Hygiene Program assumes an A-1 priority rating.

A recent War Department Circular reads, in part: "The Army owns and operates a large number of arsenals, depots, and other industrial plants, the employees of which number several hundred thousand. As an employer, the Army is obligated to furnish safe and hygienic working conditions and to maintain an adequate industrial medical service. The extent to which women are being employed in army plants makes this doubly important."

Out of the needs created by the war, there was established in the Division of Preventive Medicine in the Surgeon General's Office, U. S. Army, an occupational hygiene branch. The functions of this branch are to satisfy the responsibilities of the Army in its role as an employer to the employees.

"In this respect," as stated recently by the present chief of the branch, "the Army is in the same position as any other employer. Working conditions must be safe, unavoidable health hazards must be controlled, environmental sanitation must be enforced, and adequate medical service of the type that has become standardized in well-run American industrial establishments must be maintained."

Experience gained during the last war has shown conclusively that neglect of workers' health produced some very serious effects upon industrial efficiency; therefore, good industrial practice is a prerequisite to the well-being of the war worker and a prime industrial asset of a nation at war.

In general terms, the objectives of industrial hygiene may be summarized as the protection of health, the improvement of efficiency, and the prolongation of life of industrial workers; in short, it covers the entire field of adult health conservation. This comparatively new field of public health work was considered, until quite recently, to be concerned only with the prevention of specific occupational diseases such as silicosis and lead poisoning. However, it is now generally recognized as covering a much broader field than this, including many closely related problems such as industrial heating, ventilation, air conditioning, illumination, noise, fatigue, women in industry, overcrowding, mental and personal hygiene, industrial sanitation, and industrial medical service, including industrial nursing.

The principles of industrial sanitation include measures for the control of health hazards due to dusts, gases, vapors, smokes, fumes, and chemicals which are capable of causing occupational diseases. Industrial sanitation is also concerned with safe drinking water, sewage and waste disposal, ratproofing, screening, washing facilities, personal hygienic measures, good housekeeping and clean eating places, all of which have a detrimental effect on the health of the worker unless they are adequately controlled.

By industrial medical service is meant not merely the practice of minor surgery for a short time daily within the plant, but a comprehensive study of industrial health problems. Every effort must be made to maintain the health and productive efficiency of industrial workers at a high level. All the resources of hygiene, medical, and sanitary science must be utilized for the promotion of health and efficiency under the conditions of the particular industry. It must be borne in mind that maximum efficiency of production is achieved, not by taxing human endurance to the limit, but by conserving the health and strength of workers.

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agents or conditions, the effect on production is more serious than the number of disabled workers would indicate. As the health of employees is impaired, often by imperceptible degrees, their working abilities are decreased long before they are totally incapacitated.

By industrial nursing is meant the employment not of an untrained attendant, but the presence of a graduate nurse who has, like the physician, specialized in the field of industry. Professional industrial nursing should be available to employees within the establishment and in some cases to employees and their families in their homes. When the latter is carried out, it is with the view in mind of enhancing the health of the workers and thereby increasing personal efficiency and likewise production.

With regard to military occupational hygiene, the Army has found that occupational hazards of fumes, gases, and ducts are associated with our armored forces. To deal effectively with this new problem of warfare, there has been established a unit known as the Armored Force Medical Research laboratory which is devoted to maintaining and increasing the physical efficiency of the soldiers of the armored forces. This laboratory has also given consideration to problems of heating, ventilation, fatigue, clothing, nutrition, proper rations, and the important matter of water consumption of our armored force soldiers. In this connection, it should be emphasized that a most valuable service is being rendered by experts in determining what must be done to protect the health of our soldiers in this mechanized total war.

In addition to this, an Army industrial hygiene laboratory has been established, the main functions of which are to study environmental conditions in Army-operated plants, depots, and arsenals. In addition, valuable assistance is being rendered by the U. S. Public Health service and the various state and local industrial hygiene services. The work of these organizations has also been extended to Army-owned contractor-operated plants. Further, active liaison has been established with various Army departments such as the Ordnance Department, Chemical Warfare service, and the Air Force.

The work of the above mentioned organizations is closely coordinated through the various service commands and the various Army departments and services. Central directing control is vested in the Occupational Hygiene Branch, Division of Preventive Medicine, Office of the Surgeon General, U. S. Army.

The organized industrial health effort of the Army has recognized the changing nature of the work force. It is clear that men of military age are being replaced by women, older men, younger men, and the handicapped.

It is clearly recognized that each of these groups presents new and different industrial health problems which heretofore have been of little interest to industry, and much less to military industry. The entire problem of manpower and production in relation to the war industries cannot, therefore, be completely discussed until axiomatic industrial health problems have been considered. The transition of women, older men, younger men, and the handicapped into efficient, steady, and dependable war workers is now taking place, and unremitting attention is being given to their associated health problems. There are many ramifications to the rapidly expanding industrial medical picture. Labor and housing shortages have forced the development of housing projects, many of which have been located on or near military reservations. In the interests of sustained production, these dormitory and apartment villages require medical supervision. This is especially true as pertains to environmental sanitation and communicable disease control. Nurseries to care for children whose mothers work in the plant are also being established. Here again medical supervision is urgently required. In some places old CCC camps are being moved and set up to house war workers. Again medical supervision is essential in order that workers may be kept fit for their respective jobs. In this connection, the commanding officer of one of our large war plants recently wrote:

"It is realized, of course, that they must call on civilian doctors when doctors are available, but it is found necessary to inspect the camp for purposes of carrying out the rules of hygiene and to initiate preventive

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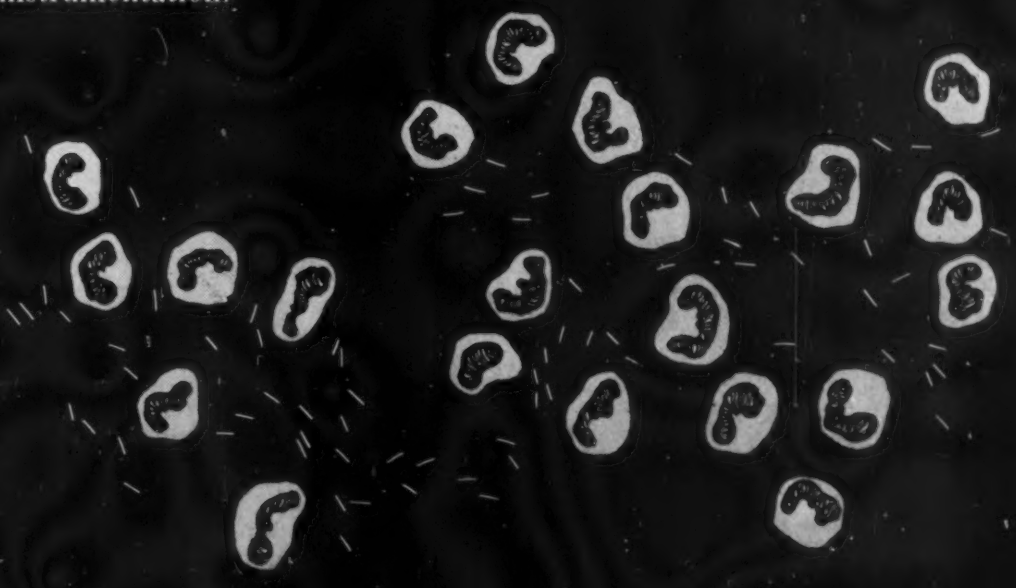

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measures of a sanitary and medical nature as many of these people, unless they are seriously ill, will refuse to go to the expense of consulting a civilian doctor. While it is appreciated that there is a limit to how far the Medical Corps of the Army should go in servicing war workers, the shortage of civilian doctors is already becoming alarming and even if our workers were willing to call them they are not available and we cannot permit people to take time off to call on civilian doctors and wait in line to be examined. Furthermore, we frequently can prevent a loss of time for illness by early administration of preventive measures."

From the letter just quoted, it is obvious that due to the shortage of available civilian physicians and civilian hospital facilities in our numerous war production areas, the question of how much medical service should be rendered to civilian employees and their dependents is becoming one of increasing importance.

In answer to this, it can now be stated that in certain designated areas approved by the office of the Secretary of War as "remote," medical care and hospitalization for both occupational and non-occupational illness and injury can be made available by the Surgeon General to Army industrial employees and their dependents. It is the intent, however, that only necessary treatment for non-occupational illness and injury be given as far as may prove practicable. It is important, however, to point out that the medical service will not be limited to first aid and emergency service. To carry out this policy, the War Department is now building a number of hospitals in the so-called "remote areas." Reimbursement for non-service connected medical care for employees and medical care for their dependents will be made on a schedule formulated by the Surgeon General's office.

It is contemplated that considerable latitude will be given to the judgment of the commanding officer and the post surgeon in carying out the new policy. The underlying motive is the conservation of man-hours with the view in mind of increasing production.

Where practicable, military and civil personnel will be treated at the same hospital and with the same facilities in order to avoid unnecessary duplication of equipment and personnel. At certain installations because of military reasons, this may not be practicable, but insofar as possible, the greatest conservation of equipment and personnel will be made.

Relative to the extent of medical service at Army-owned and Army-operated plants, depots and arsenals not in remote areas, it has been clearly demonstrated that considerable time can be saved and production thereby increased by adequate emergency medical service being rendered to employees for any cause which requires "outpatient type" of treatment during duty hours. Depot, arsenal, and plant surgeons have been directed by the Surgeon General to render this service.

Civilian personnel of the Federal government in non-remote areas who, under certain conditions, are entitled to medical care and treatment at public expense under the provisions of U. S. Employees' Compensation Act, will continue to be hospitalized in federal institutions or referred to the nearest designated U. S. Employees' Compensation Commission medical facility.

Medical attendance for military personnel at non-remote stations will continue to be furnished as provided in Army regulations.

In conclusion, it is stated that the Army is now probably the largest employer of labor in the country, and every effort must be made to maintain the health and productive efficiency of these workers.

It has been pointed out that modern military activity depends basically on efficient and coordinated industrial production and that industrial health is a "prime contractor in this nation's war." It has been pointed out that effective work in industrial hygiene requires the closely coordinated efforts of the physician, the engineer, and the chemist. It has been pointed out that the War Department is cognizant of the need for an industrial medical program and that the organized industrial health effort of the Army has recognized the changing nature of the work force; and, lastly, due to the stress of the times and the obligations which the Army has to its employees, it has been necessary in the name of produc-

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tion to adopt a new and expanded policy of industrial medical care for employees and their dependents in remote areas with the view in mind of aiding the success of our total war effort. The establishment of an adequate medical service will improve the civilian personnel situation in remote areas and thereby permit Army plants, depots and arsenals located in these areas to adequately perform their assigned missions.

Putting the Disabled Veteran Back to Work

H. L. KRIEGER, M.D.,
Medical Director, Ford Motor Company, Detroit

THE FORD MOTOR COMPANY in the past has consistently endeavored to hire a cross section of the community, "taking on," roughly speaking, 10% of its employees from disabled workers. In some communities this percentage is higher, in others lower. These disabled workers, in the vast majority of cases, cause no trouble either from a compensation angle, the quality of their workmanship or the quantity of their production. It is our impression that these men, knowing their disabilities, are less liable to accidents than normal workers, because they will not take chances.

We are endeavoring to handle the rehabilitation of the returned soldier just as we would handle the employment and placing of any handicapped employee. In order to do this we have divided the returned soldiers, with medical discharges, into two groups. (1) Inactive—those who have not been overseas, and (2) Active—those who have seen overseas duty. In the inactive group, many of the medical discharges, in fact the majority, are for common, ordinary, every-day disabilities that do not amount to very much in the realm of industry, but yet take on a grave aspect so far as the armed forces are concerned.

Of the 348 returned men who have been replaced as of October 1, 292 are from the Army, 38 from the Navy, 10 from the Marines, three from the Coast Guard and five from branches of the Service not listed by us. Thirty-nine of these men were discharged with a medical diagnosis of "flat feet." You can readily see that all we had to do was to reinstate those men on their old jobs, if possible. If not, any job in the factory, other than "follow-up work," and this group is satisfied. Undoubtely a soldier with flat feet cannot march, yet he is not considered a handicapped man in industry.

On 41 of the discharge papers appears the diagnosis of "nervousness." Not very enlightening. However, on talking with many of these boys we are of the opinion that they are not so far off the beaten path. At any rate, reinstating these boys on their old jobs, surrounding them with familiar faces and names, and perhaps even the old familiar noises of a hammer shop, certainly does not bring out any abnormal tendencies so far as we can ascertain. They become self-supporting, take their place in society, and can be classed as rehabilitated soldiers.

One man in our group was discharged because of an allergy to wool. He is not an industrial hazard. Many non-specific diagnoses were made. In a large percentage of the cases the diagnosis is definitely specific. For example, 15 men were discharged from the Armed Forces with a diagnosis of "stomach ulcers." The accuracy of the diagnosis is not checked by us. We request a letter from a G.I. man (gastro-intestinal physician), and if the patient can be treated as ambulatory then we allow him time to take his extra food or medicine, say at 10:00 A.M. and 3:00 P.M. In the meantime he is placed on suitable work by the Medical Transfer Department.

Excepts from DR. KRIEGER'S paper as presented at the Eighth Annual Meeting of Industrial Hygiene Foundation, Pittsburgh, November 10, 1943.

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Assistant Clinical Professor of Nervous Diseases, Western Reserve University School of Medicine, Cleveland, Ohio

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Sun-stroke, sinus infection, asthma, hydrocele, ruptured left ear drum, etc., are all examples of specific diagnoses in this group. The placing of these discharged men back at work in industry is no trouble. This group is easy to handle and can be readily placed.

The soldiers returned from overseas duty are usually discharged with a definite disability and quite frequently permanent. These are the men the government has spent time and money in training; the men who have seen active service. They have been wounded and have stayed in hospitals until their wounds healed, and now present themselves for work. Jobs must be found for one-armed men, for one-legged men, for one-eyed men, and for men who have recovered from tropical diseases, from serious infectious diseases and from most everything that affects a soldier. These returned soldiers are just like Group No. 1, only their disability is more definite. They, also, are handled by the Medical Transfer, only in their instance it may take several days to locate a suitable job.

I am sure that the workings of this department. i.e., Medical Transfer, are a great help to the Ford Motor Company. There are 10 people assigned to the Medical Transfer Department. Two men and one woman are classified as plant investigators, and it is their duty to roam about the plant looking for special jobs available for handicapped employees. There are three men at the front desk whose duty is to listen to complaints, make notes, and later in the day group these complaints into buildings and assign investigators. We have two people on typing, filing and keeping our "live files" up to date. One man is assigned to handle compensation cases only, and one man is in charge. It is to be noted here that all of the above personnel have ability far beyond the ordinary in the art of persuading a foreman to take a handicapped individual. Also assigned to the medical transfer, are a plant physician and sufficient nurses and first aid men to handle the pre-employment examinations the Medical Transfer Department may request.

In the case of a former employee, one who has been handicapped and is returning to work, we give him a letter to his previous foreman asking "if he can use." If the answer is yes, then that former employee is placed on his old job and he goes to work. If the answer is no, then it becomes necessary for the medical transfer department to locate a suitable job. The prospective employee and the investigator now get together. The investigator, having at his fingertips almost all of the available jobs, can soon take this man to a department that has the type of work he can best do, and in a short time he is working.

Card index data of all physically handicapped are on file. And a card index of all departments, giving a brief description of the department, location, foreman, operation performed, type of work, stock handled and types of employees preferred, is now being completed. We feel that this index is invaluable. In a moment's time you can check department, say K-906, and know if they have grinders, drill presses or polishers, etc., the weight of the stock handled, and what is available for handicapped workers. In many cases non-productive hands are transferred to productive jobs as acquaintance with shop work improves and ambitions dictate. On the other hand, many old timers, some of them heart cases, request special non-production work, sometimes even asking for, and getting, five-day week, eight-hour day jobs.

We also insist on our plant physician becoming thoroughly acquainted with the jobs under his supervision. This necessitates that the doctors travel around the plant, accompanied by a safety inspector. In this manner the physician can acquaint himself. from personal knowledge, with the type of work being done in the various buildings.

In summary, the problem of rehabilitating the returned soldier solves itself by our regular policy of hiring and placing handicapped workers. A department which we have designated as Medical Transfer is set up and maintained specifically to handle handicapped individuals. We believe this department to be vital, and its personnel must be very carefully chosen.

"Angel Eyes" and "Zinc Shakes"

—Industrial Hygiene Foundation's Eighth Annual Meeting as Summarized for the Press—

GILBERT LOVE,
Special Correspondent, The Wall Street Journal

WHEN a workman gets "angel eyes" or the "zinc shakes" these days his company quickly goes into action.

These are two unusual ailments among dozens of occupational diseases against which American industry is waging a determined campaign. Until recent years many companies went along on the assumption that health laws covered the situation. Today most of them go a lot further. The wartime necessity for conserving manpower has given the movement a tremendous impetus.

This week representatives of such leading American industrial companies as General Motors, Bethlehem Steel, Aluminum Co., Anaconda Copper, Johns-Manville and Westinghouse Electric have met here to exchange the latest ideas on fighting factory diseases. They are among the 275 companies which belong to the decade-old Industrial Hygiene Foundation and they were attending the annual convention which closed last night.

An occupational ailment, the hygiene experts agreed, may turn up anywhere and frequently does. Take "angel eyes," for instance. It's a new and not very widespread one, deriving its name from the fact that those who have it see a hazy halo around lights when they look at them. The cause is excessive exposure to hypochlorite dust.

The "zinc shakes," otherwise known as metal fume fever, is an affliction well known to welders and pipefitters who apply their torches to galvanized iron and breathe in the zinc oxide fumes.

Because there is considerable welding of galvanized iron in shipyards making combat vessels, the yards insist that workers be protected either by exhausts which whisk the fumes away or by masks which prevent the fumes from being breathed. Masks also are provided those shipyards welders who might have to work on metal that has been painted, because lead fumes that come off burning paint are also toxic.

Bomb and shell loading plants must take special precautions, too. R. H. Flynn of the United States Public Health Service says that medical supervision of workers and engineering improvements in these plants are paying dividends. In the first 93,000 man-years of operations in this war there were only 475 cases of TNT poisoning reported; there were eight deaths. This covers a much longer period than the first seven and one-half months of the World War of a generation ago, when 17,000 cases of this poisoning developed and 475 deaths resulted.

Sometimes, on examination, a suspected health hazard turns out to be a dud. Welders working in the double bottom spaces of ships at one yard developed night coughs. Many of them feared they had tuberculosis. Examinations failed to reveal any symptoms, however, and when these men were shifted to places where the ferric oxide fumes could not accumulate their coughs disappeared.

As an example of how the large industrial corporations attack this problem, there is the case of the Westinghouse Electric & Manufacturing Co. About 10 years ago it established an industrial hygiene laboratory here in Pittsburgh. The laboratory served its plants in other parts of the country, too. The five hygiene engineers who man this laboratory constantly are taking dust counts in various parts of the plants; when they discover harmful concentrations they recommend dust hoods or changes in ventilation.

The Westinghouse experts also maintain a "rogues' gallery" of production materials that might be harmful to workers. When a new material is first used in a plant they analyze it, index their findings and send full information to the foreman of the shop using this material, with a list of precautions that should be taken. At present there are more than 9,000 materials in this "rogues' gallery."

The work of this industrial hygiene laboratory is supplemented by Westinghouse's medical department, which gives periodic examinations to all persons working around toxic or otherwise dangerous materials. Established long before the laboratory, for preemployment examinations and other duties, the medical department now has a roster of 40 doctors and 100 nurses in all Westinghouse plants.

Westinghouse officials point with pride to the fact that their employees who worked 185 million man-hours last year lost only 2,000 hours because of occupational ailments.

Other companies take comparable precautions. The Ford Motor Co. even has a medical transfer department which sees that handicapped persons are placed in jobs that will not harm them.

Has the employment of large numbers of women in industry added to the health problems? The answer seems to be no. At the Industrial Hygiene Foundation meetings here a special report on this subject indicated that there are no widespread occupational ailments peculiar to women unless they are given tasks beyond their physical capacities. High absentee rates for women, according to the report, are caused largely by the fact that most of them are trying to do two jobs—one at the factory and one at home. They have to shop, cook meals, mend clothing and look out for children in addition to serving a shift at the factory.

Research men of the Industrial Hygiene Foundation find that skin troubles are the most numerous of all occupational diseases. One plant solved this problem by providing separate locker rooms for workers' street clothes and for their working clothes. There was a supervised shower room in between.

The Wall Street Journal, New York, November 12, 1942.

The Relation Between the Family Physician and War Industry

CAPTAIN KARL PICKARD, M.C., A.U.S.,
Depot Surgeon, Wittemore Ordnance Depot,
Ayer, Massachusetts

THE problem of absenteeism in war industry has received considerable mention during the past several months. It is with the solution of this problem as the goal that complete cooperation is being asked of civilian family physicians, and it is with such a thought in mind that this paper has been prepared. It is hoped to point out the seriousness of the condition and the factors involved in absenteeism, the job involved in preventive measures and the need for complete understanding and cooperation between the industrial physician and local attending physician, employees and the community as a whole.

It must be borne in mind that present-day conditions have brought into industry the very young worker, the relatively old worker and the female worker. These employees are inexperienced. In some cases they are physically below standard. Their environmental conditions are often poor. They have moved into localities near their places of employment, thus creating crowded and unsanitary conditions. All these factors furnish innumerable reasons for the present-day difficulties. They explain the frequency rate of accidents, the increase in rate of disabling diseases and the resulting absenteeism with its slowing of production of the supplies that the men at the front must have.

Industry itself has made sweeping progress in the handling of its medical problems. It has established complete medical and nursing services, hospitalization service and the means of education of the workers concerning hazard prevention and disease control, personal hygiene and sanitary methods, both at work and at home. In addition, it has established proper housing facilities, care for children of working mothers and ease in transportation to and from work. All these things are being done daily. What is the family physician doing to aid? What can he do to aid more?

In *New England J. Med.*, November 4, 1943.

Let us glance at the problem that confronts the industrial surgeon. He is far removed from the days when minor traumatic surgery was his chief concern. His job is one of preventive medicine, of medical supervision, sanitation and hazard control and of education of the employee.

The new employee is processed for his job. He must first undergo a strict and complete physical examination, often including visual acuity, pelvic examination in the case of women, serologic examination, urinalysis and x-ray studies of the chest. This preemployment examination is not made for the purpose of disqualifying the prospective employee. It is done with one thought in mind: that of placing the applicant at the proper job, at the job that will not be detrimental to his health and at which he will be able to do the most work with the least possible disability. In this respect the family physician can be of great help.

Many people object to complete examination and to inquiries into their past medical histories. Many are afraid of the "blood tests." A word from their own doctors would save much time and lead to complete cooperation. There are occasions when a prospective employee has been asked to seek the advice of his family doctor because of an existing condition that has been discovered — hypertension, sugar in the urine, a positive serologic reaction or a pulmonary lesion that requires attention. This is done so that the employee will put himself under medical attention and so that his time lost from sickness will be at a minimum. Sadly enough, my own experiences have shown that instead of enlightening the patient, the family physician sometimes minimizes the condition. In other cases the family physician sends in a report reading, "I have examined this man and find him fit for work." He does this thinking that his statement will be of assistance in getting a job for his patient. This is entirely erroneous, because every bit of manpower is needed, and no person is refused employment if it is at all possible to hire him for some job, whether it be arduous, moderately heavy or light. On the other hand, valuable cooperation is given by the family physician who writes as follows: "I have examined this man and find him to have a hypertension (170/90). To my knowledge he has done work of a similar nature for the past 10 years with no untoward effect. He is now under my care and will receive treatment periodically." With such a recommendation, the industrial physician feels safe in accepting this man for proper employment, and thus an attitude of friendly confidence is established.

In certain specialized fields, periodic examinations of employees are demanded. Here, too, the family physician can be of tremendous help in explaining to his patient that this is done merely as a protection, and that the employee is checked to see that an early difficulty is remedied so that he can be kept at his original position.

One of the greatest problems is that of examinations following illness. In most plants the worker must be checked by the Medical Department before returning to work, and in most cases he is asked to present a written statement from his family physician concerning the nature of his illness. Here again my experience has been unfortunate. The notes from physicians have been worthless in the majority of cases. They simply state, "This man can now return to work." They do not include the diagnosis, nor do they indicate the severity of the complaint. They do not explain the number of visits or the possible necessity of subsequent visits. Industry is making every effort to check unnecessary absence and to lessen the extent of legitimate sickness absenteeism by keeping accurate statistical records and by analyzing and correcting the difficulties thus established. Certain plants are sending out visiting nurses mainly to help the patient during his period of recovery or to have him seek medical attention when he has not done so, in order that he can return to work at the earliest possible date. If the family physician would only acquaint himself with these facts, he would then understand the necessity for careful detailed explanations of his patient's absence.

Every effort is being made on the part of industry to return the worker to some job as soon as he is able to hold one after any illness. It would be wise for the family physician to acquaint himself with the type of work that the patient performs, so that he too can recommend return at an early date. In addition, it would be wise for him to know that there are always light jobs available for the worker who is weakened by some ailment, and to advise his patient to return to the Medical Department of his particular industry and be placed at such activity.

THE increasing number of women in industry presents several problems. Many women with mild menstrual disorders find that the change of environment and the type of work to which they have subjected themselves increase their difficulties. All plants have the proper facilities for rest, nursing care and medication. For those who must lose one or two days regularly, work routines have been established so that they can make up the lost time. In severe cases, attention by the family physician is always suggested. Here his cooperation is of the utmost importance. He should make every effort to get his patient well as quickly as possible and should make sure that the job is not the causative factor. Those women who are suffering from menopausal vasomotor disturbances should be under the care of family physicians and receive appropriate therapy. Here, too, a detailed statement from the family physician will prevent improper placement of the worker. During pregnancy it is demanded that the worker receive ante-partum care and that she be released from her job at the thirty-second week of pregnancy. In all cases she must receive a statement from her physician to the effect that her work is not contraindicated. Nursing mothers, as a rule, should be refused employment.

The problem of proper care for children of mothers in war industry is a difficult one, and here the family physician can be of tremendous help in treating these children early and conscientiously.

PUBLIC-HEALTH authorities are waging a quiet and efficient battle against absenteeism. Recently in an industrial plant a group of several thousand men were prevailed on to stay at their jobs after they had begun a mass walkout because of the rumor of a contagious diseases that was spreading among the workers. The public-health authority arranged a meeting with the management, the union officials and representatives from the workers. A program was established whereby corrective measures were instituted immediately and education of the workers as to their personal protection was begun. In this way, a tremendous man-hour loss was averted. At the Whittemore Ordnance Depot two similar experiences have occurred. In one case there was rumor of lead poisoning among the painters because of an erroneous statement. At the time an investigation of such a condition among both painters and battery men was being conducted. Conclusive laboratory evidence was discovered that no such condition existed. It was then possible to allay all fear among the workers. In the other case innumerable notes were received from family physicians stating that workers were suffering from carbon monoxide poisoning. This created considerable disturbance among hundreds of employees. The Division of Occupational Hygiene of the Massachusetts Department of Labor and Industries which studied the matter, showed that the carbon monoxide content of the plant air was considerably below the 100 parts per million that was allowable. Had the family physician approached the Medical Department himself, this trouble would have been avoided.

The family physician should make every attempt to work with public-health authorities and with plant medical departments by assuring his patients of their efficacy. He should acquaint himself with the exact nature of his patients' jobs. His cooperation as concerns all the factors involved in eliminating absenteeism would make for complete understanding between the worker, the management, the plant medical department and the community as a whole, and in this way would be tremendously beneficial in helping toward greater production and complete advancement of the war effort.

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